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(12) **United States Patent**
Grepper

(10) **Patent No.: US 10,415,868 B2**
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(54) **COOLER HAVING INTEGRATED BLENDER AND ACCESSORIES**

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(72) Inventor: **Ryan Grepper**, Portland, OR (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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(65) **Prior Publication Data**

US 2018/0266747 A1 Sep. 20, 2018

Related U.S. Application Data

(63) Continuation of application No. 14/530,541, filed on Oct. 31, 2014, now Pat. No. 9,976,789.
(Continued)

(51) **Int. Cl.**
F25D 3/08 (2006.01)
A47J 43/07 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC ***F25D 3/08*** (2013.01); ***A45C 5/14*** (2013.01); ***A45C 11/20*** (2013.01); ***A47J 43/046*** (2013.01); ***A47J 43/0722*** (2013.01); ***A47J 43/085*** (2013.01); ***B01F 7/0025*** (2013.01); ***B01F 7/162*** (2013.01); ***B01F 13/0018*** (2013.01); ***B01F 15/00519*** (2013.01); ***B01F 15/00538*** (2013.01); ***B65D 51/24*** (2013.01); ***B65D 81/3813*** (2013.01); ***B65D 81/3816*** (2013.01); ***F25D 23/00*** (2013.01); ***F25D 23/12*** (2013.01);
(Continued)

(58) **Field of Classification Search**
CPC B01F 15/00538; B01F 13/0018; B01F 7/162; B01F 7/0025; A47J 43/085; A47J 43/046; B65D 81/3816; B65D 81/3813; B65D 51/24; F25D 3/08; F25D 23/12; F25D 23/00; A45C 11/20; H02J 7/0047
See application file for complete search history.

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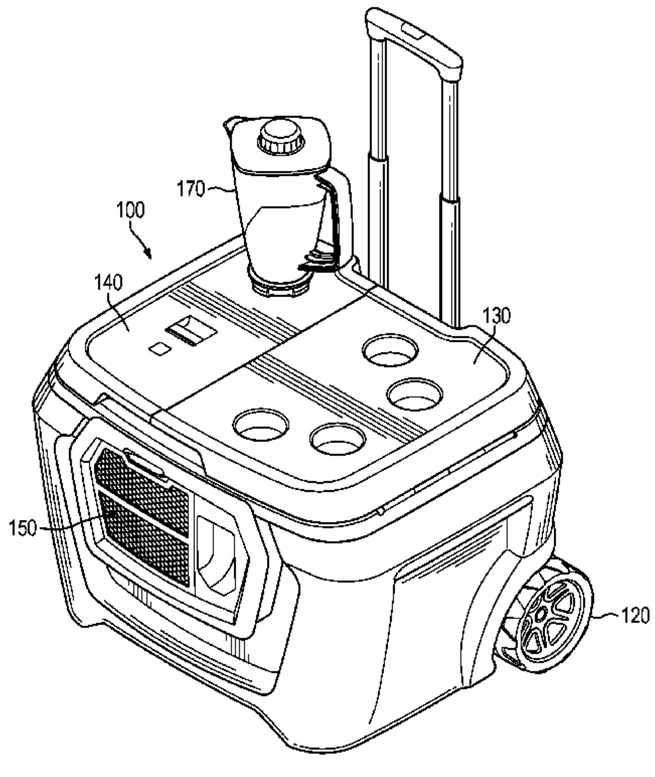
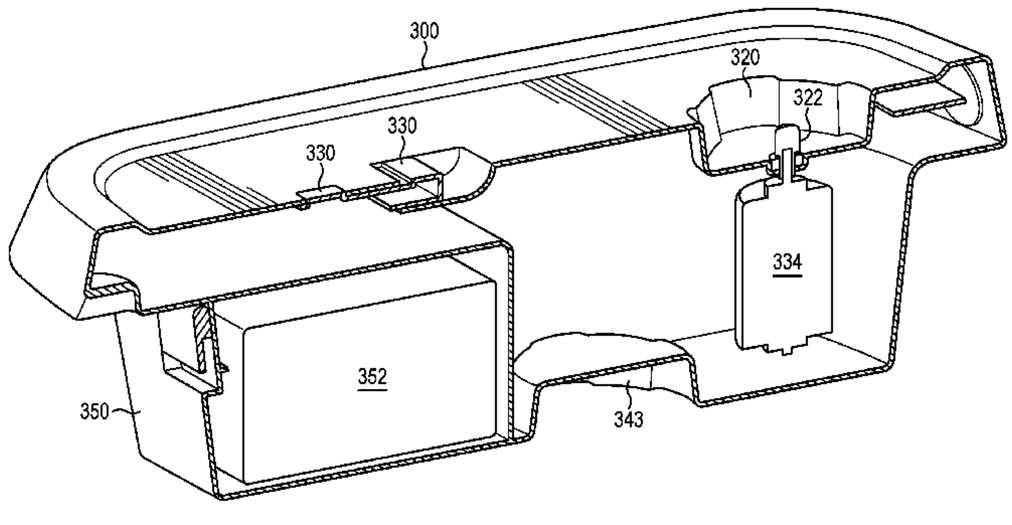
(57) **ABSTRACT**

A portable cooler includes an insulated body that defines a main interior storage space, and a lid structured to at least partially cover the main interior storage space. The lid includes an integrated blender or an integrated blender drive. Components of the blender may include a source of electrical power, an electric motor, and a blender spindle mounted through a surface of the lid and coupled to the electric motor. The integrated blender may also include a blender jar structured to hold food items for blending and one or more blending blades. The lid may further include a blender recess shaped in a negative mold of a collar of the blender jar to prevent the blender jar from rotating during operation.

18 Claims, 32 Drawing Sheets





Related U.S. Application Data

(60) Provisional application No. 61/898,344, filed on Oct. 31, 2013.

(51) **Int. Cl.**

A47J 43/08	(2006.01)
B01F 7/00	(2006.01)
B01F 15/00	(2006.01)
B01F 7/16	(2006.01)
B01F 13/00	(2006.01)
B65D 51/24	(2006.01)
F25D 23/00	(2006.01)
B65D 81/38	(2006.01)
H02J 7/00	(2006.01)
A47J 43/046	(2006.01)
A45C 11/20	(2006.01)
F25D 23/12	(2006.01)
A45C 5/14	(2006.01)

(52) **U.S. Cl.**

CPC ***H02J 7/0047*** (2013.01); ***H02J 7/0063*** (2013.01); *F25D 2303/081* (2013.01); *F25D 2400/38* (2013.01); *H02J 2007/0067* (2013.01)

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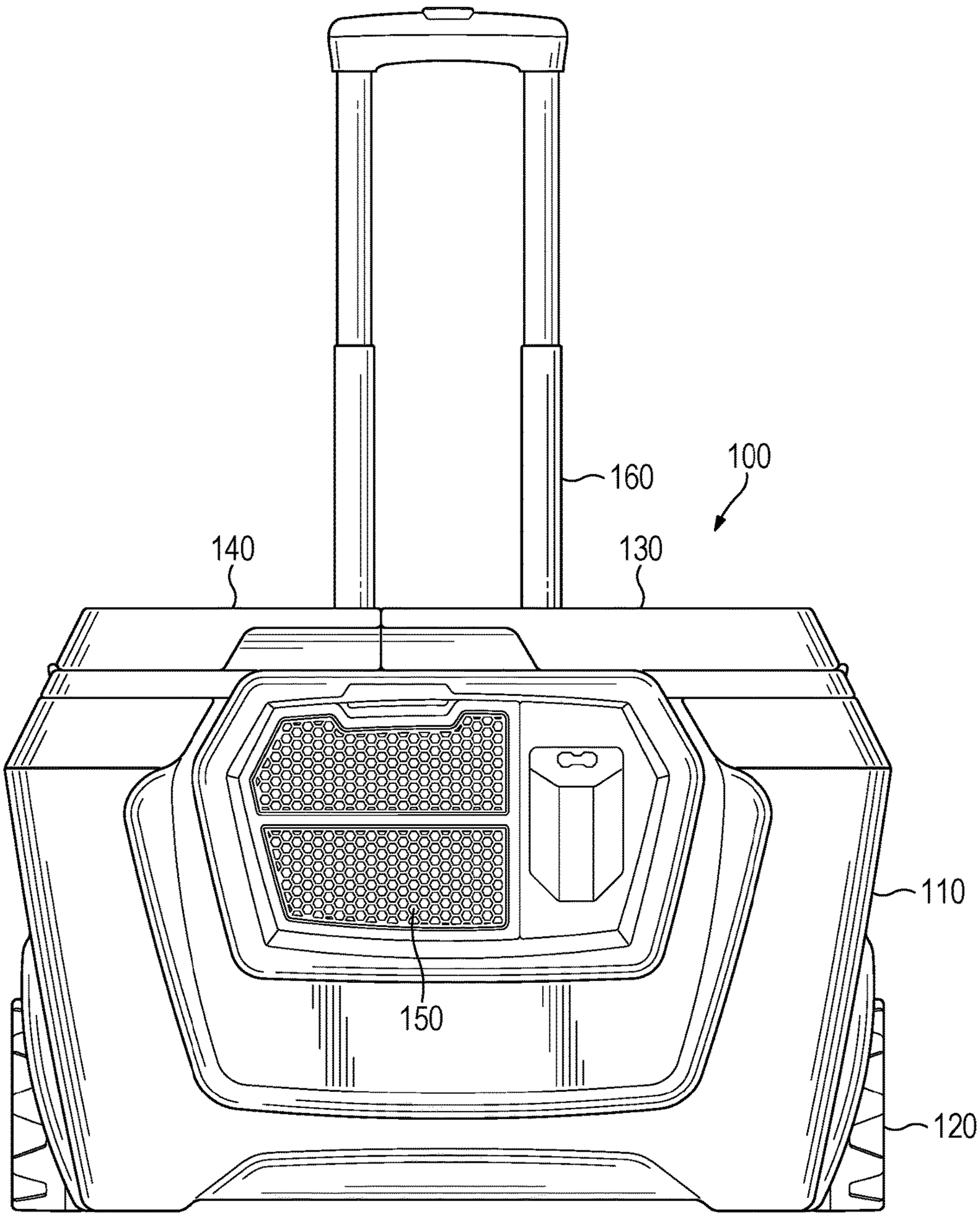


FIG. 1A

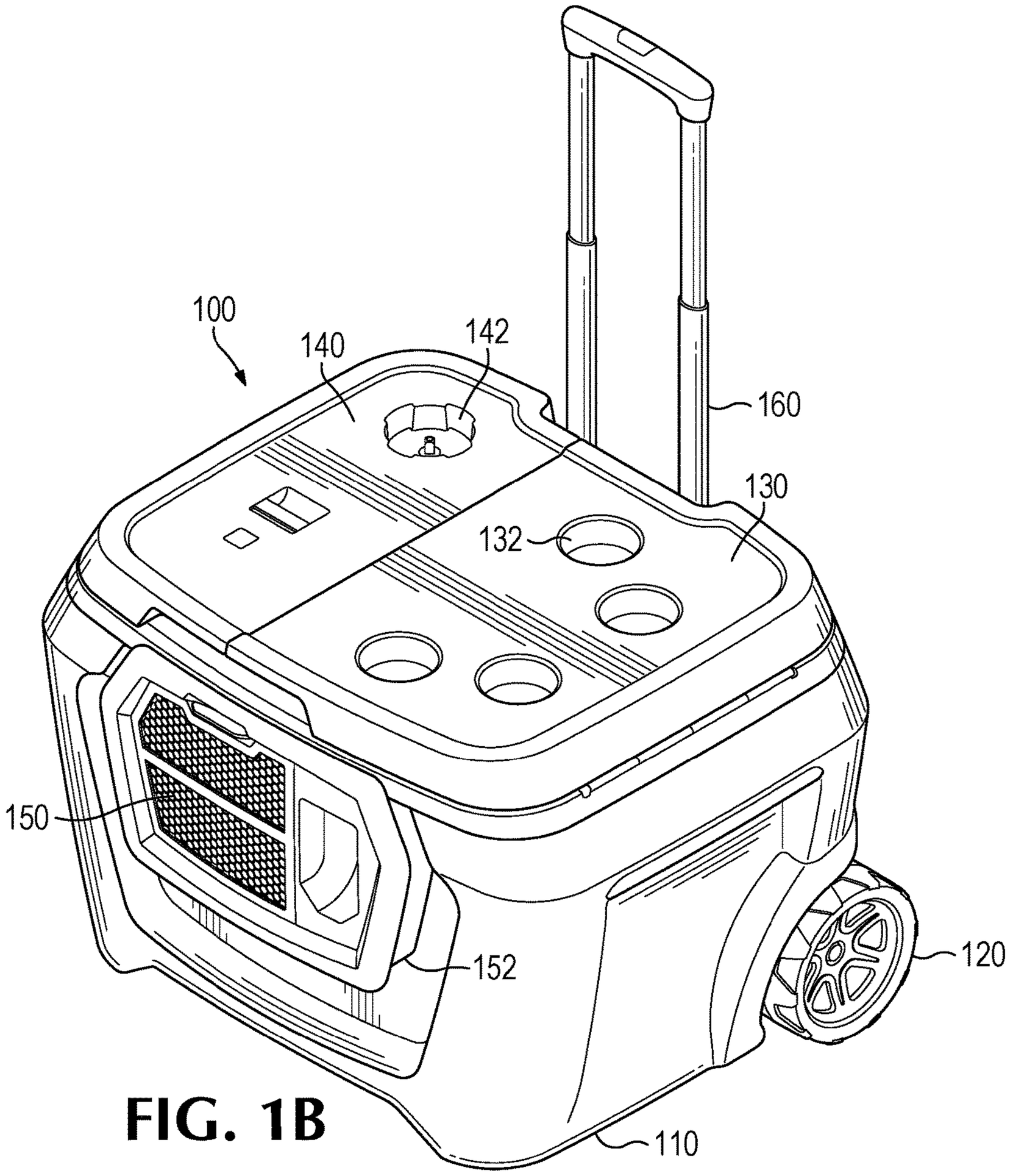


FIG. 1B

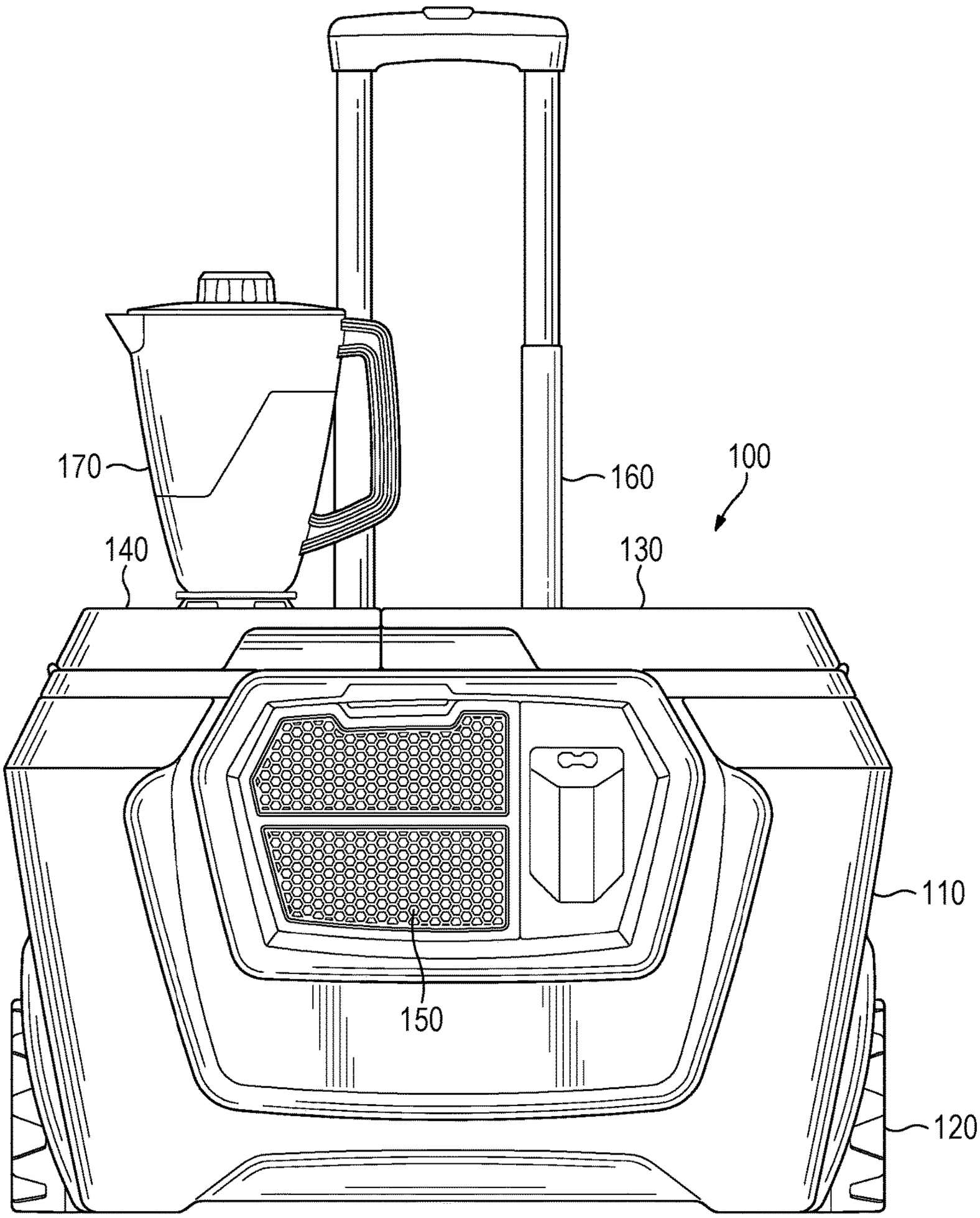


FIG. 2A

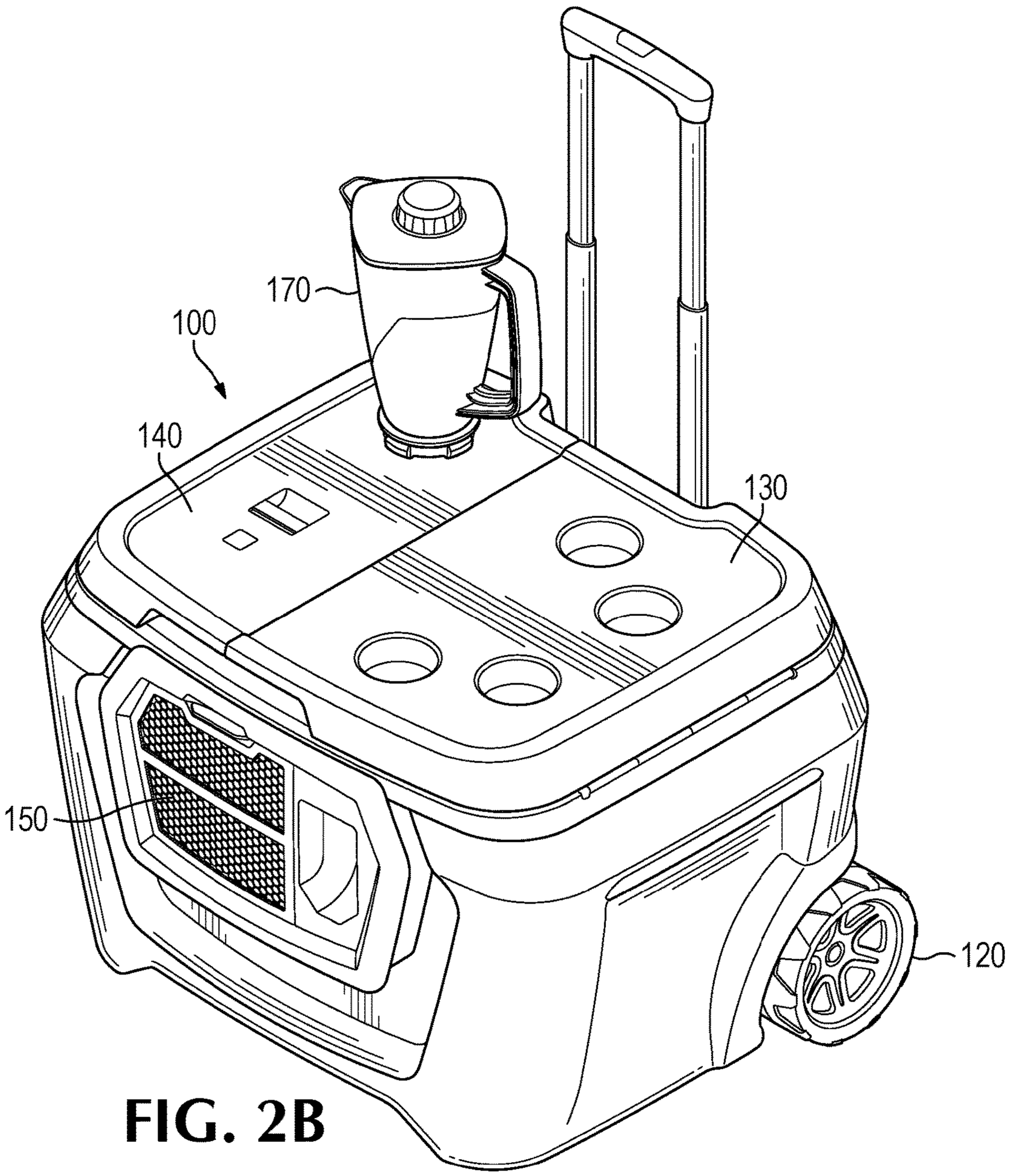


FIG. 2B

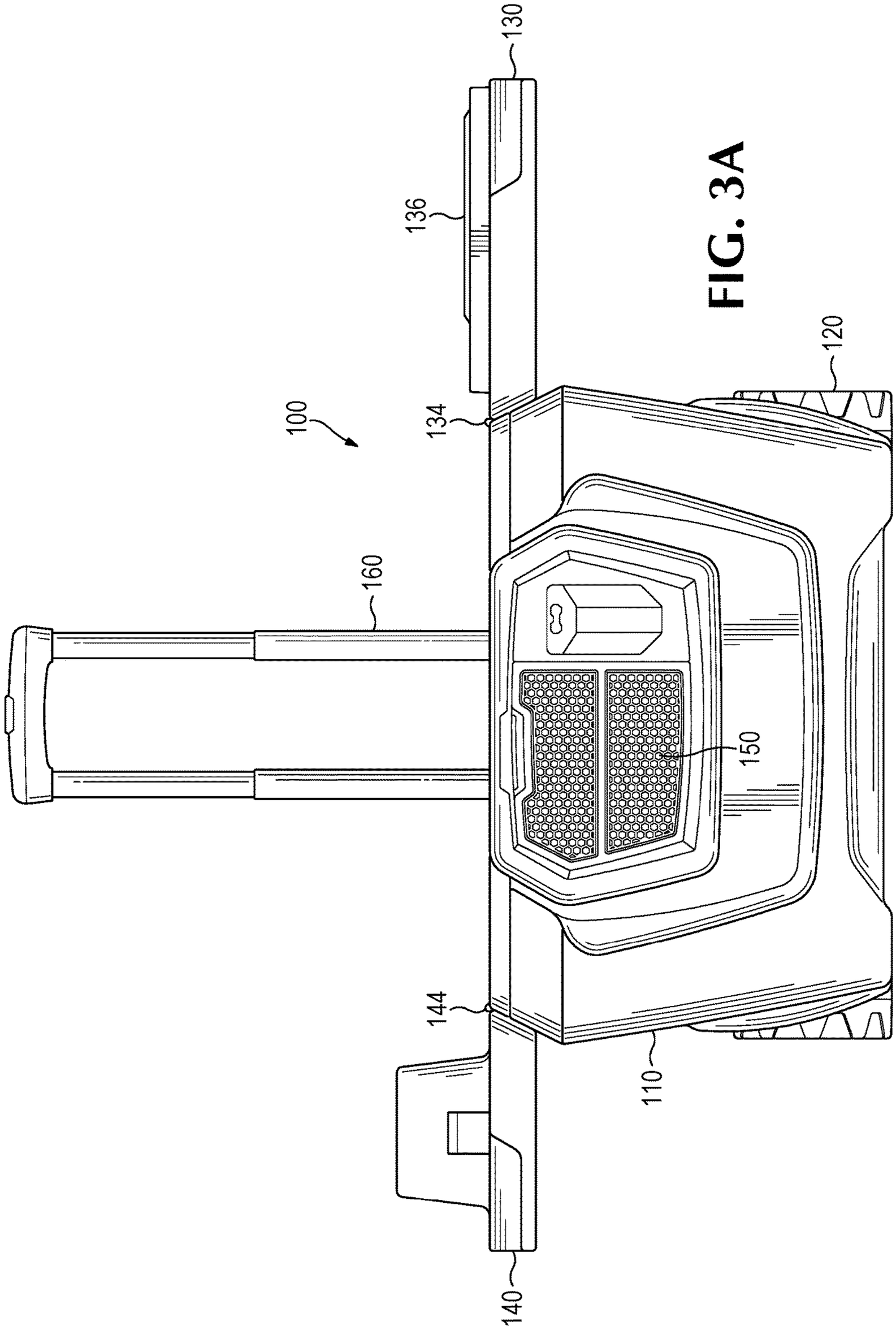


FIG. 3A

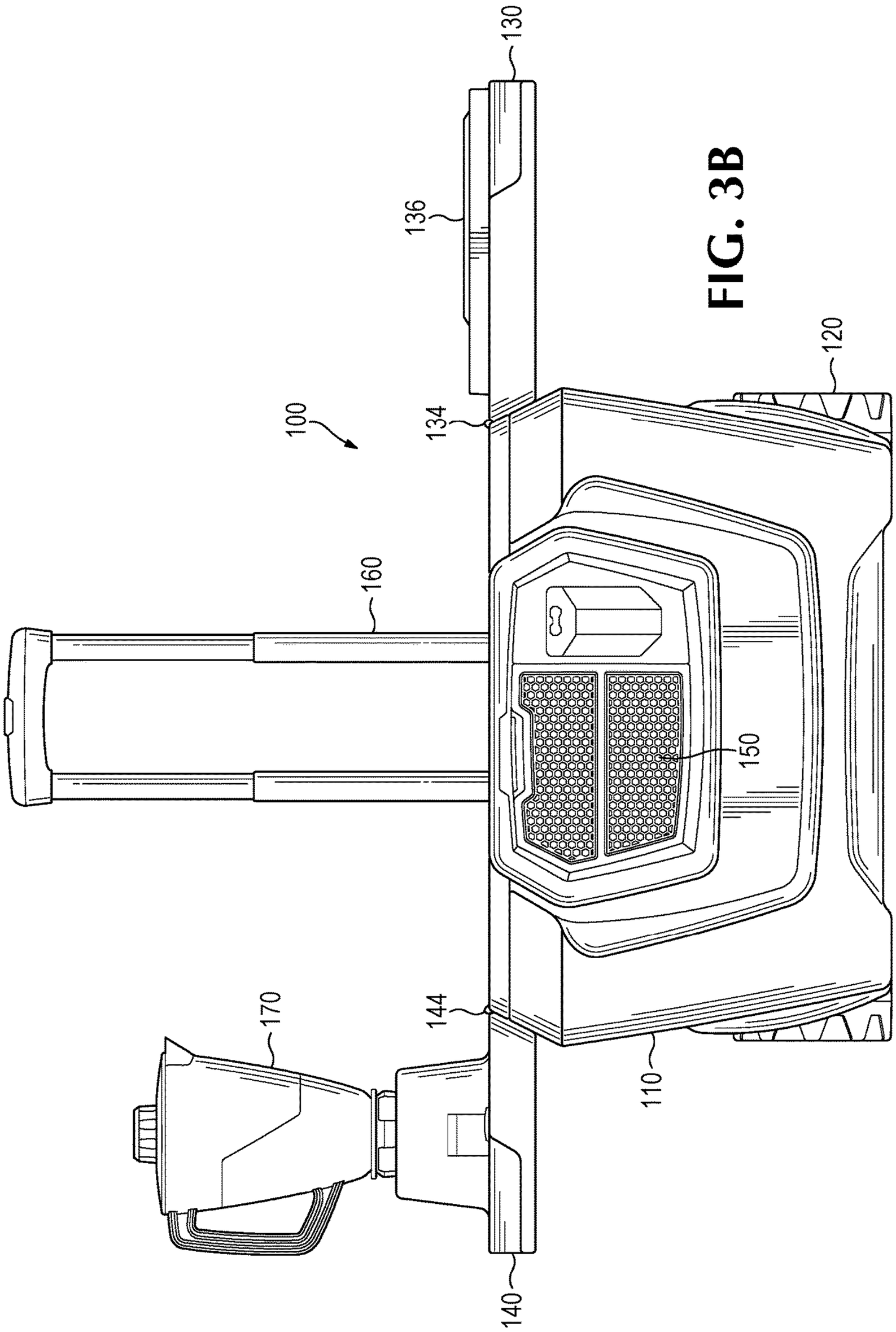


FIG. 3B

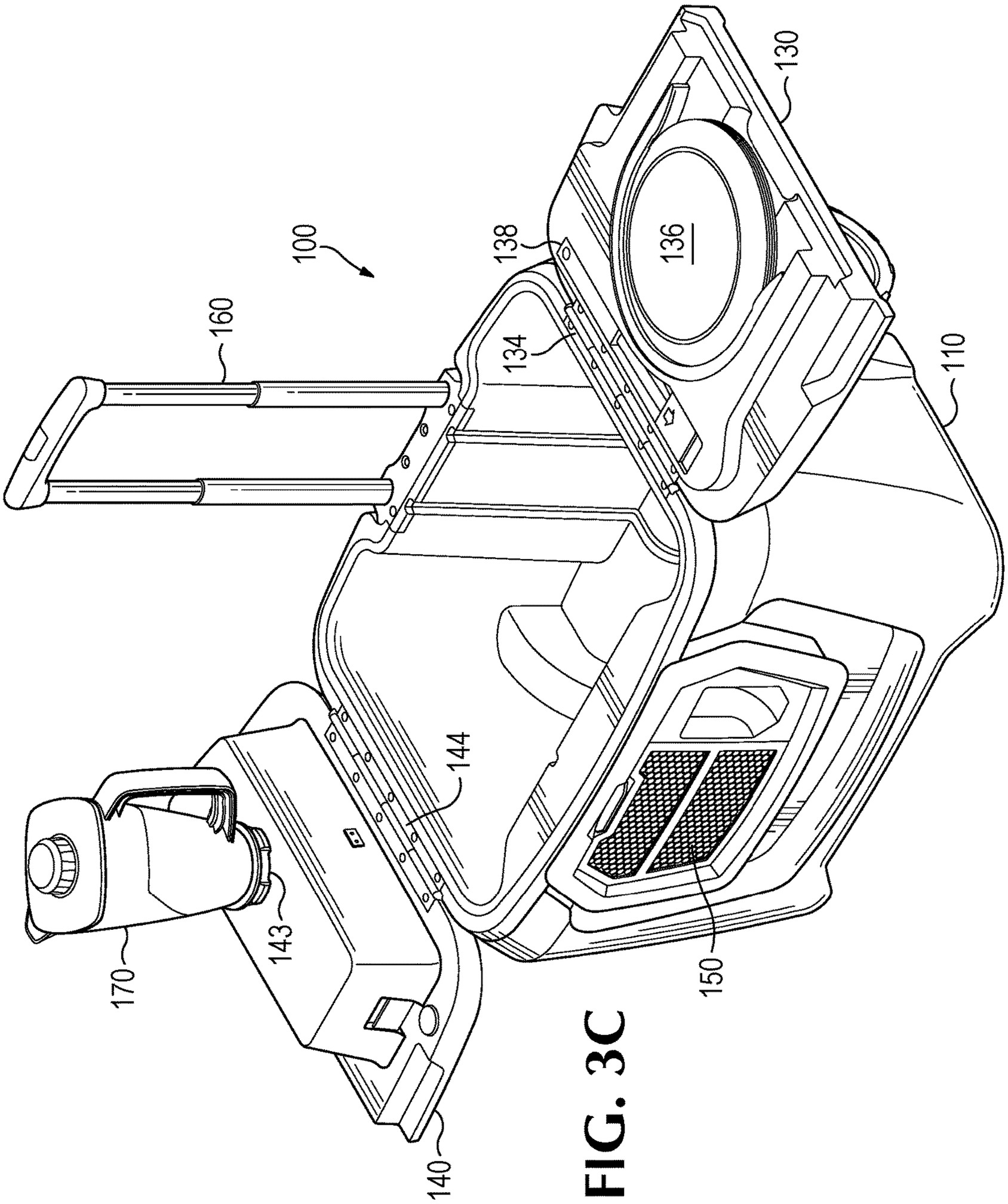


FIG. 3C

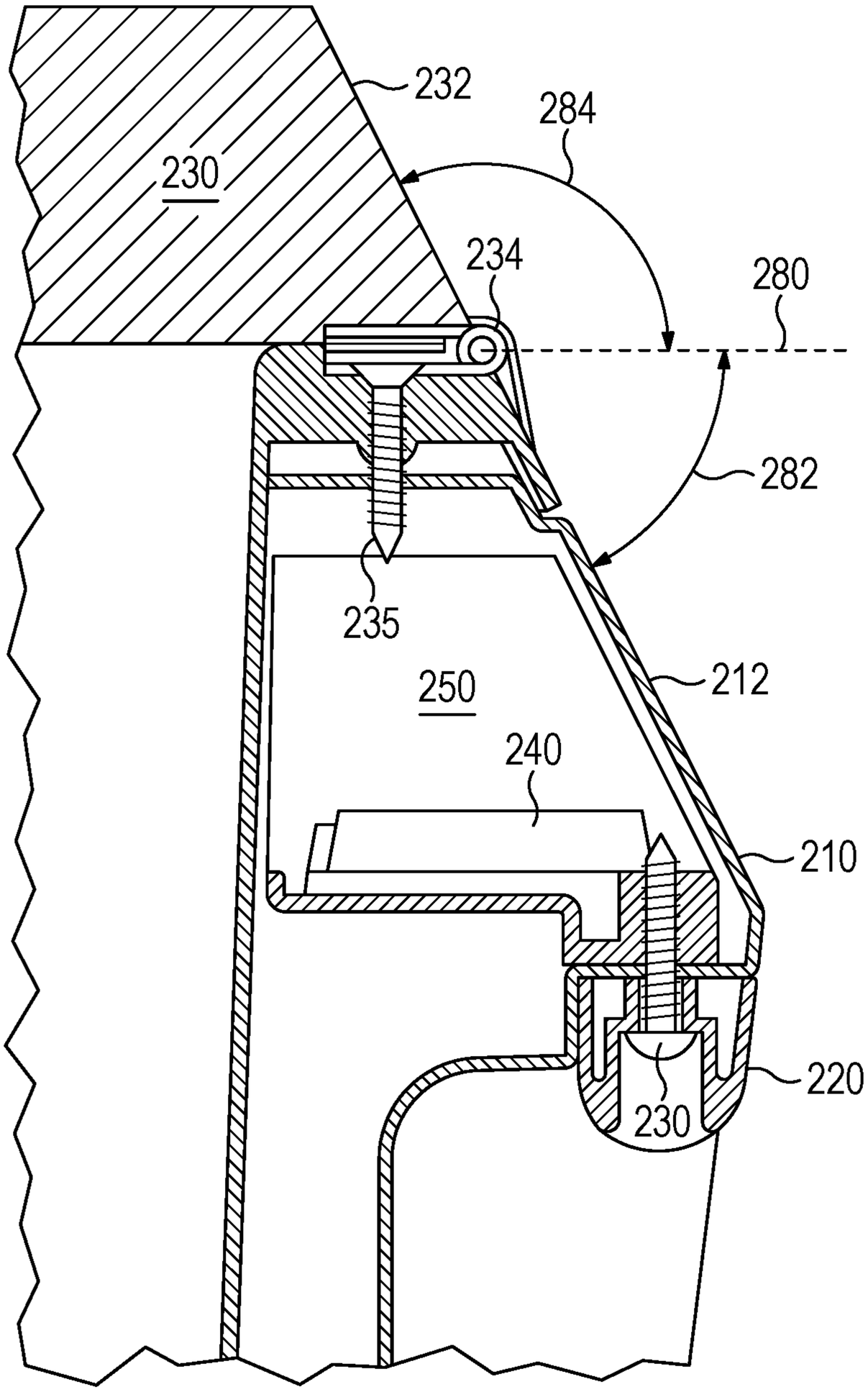


FIG. 4A

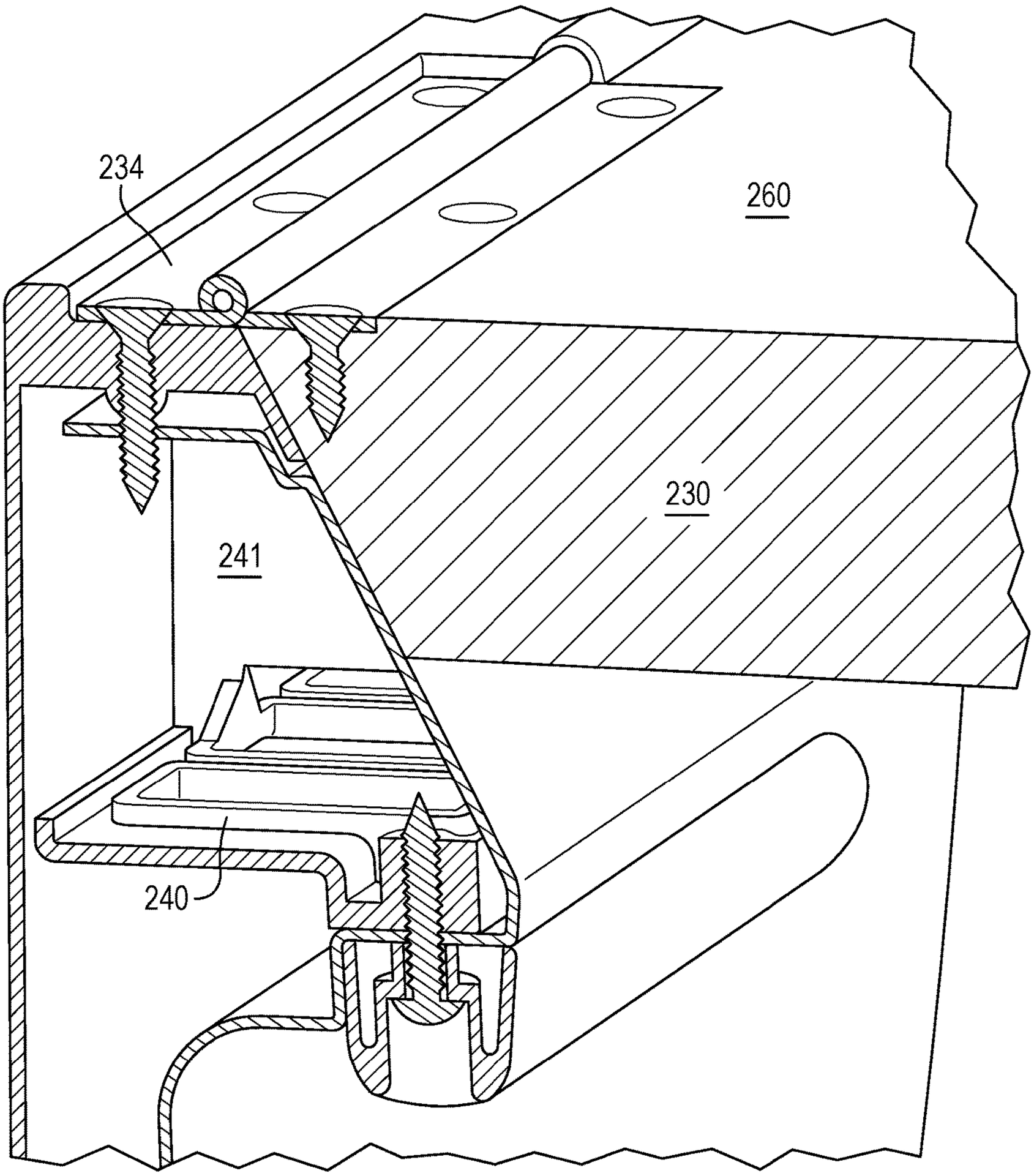


FIG. 4B

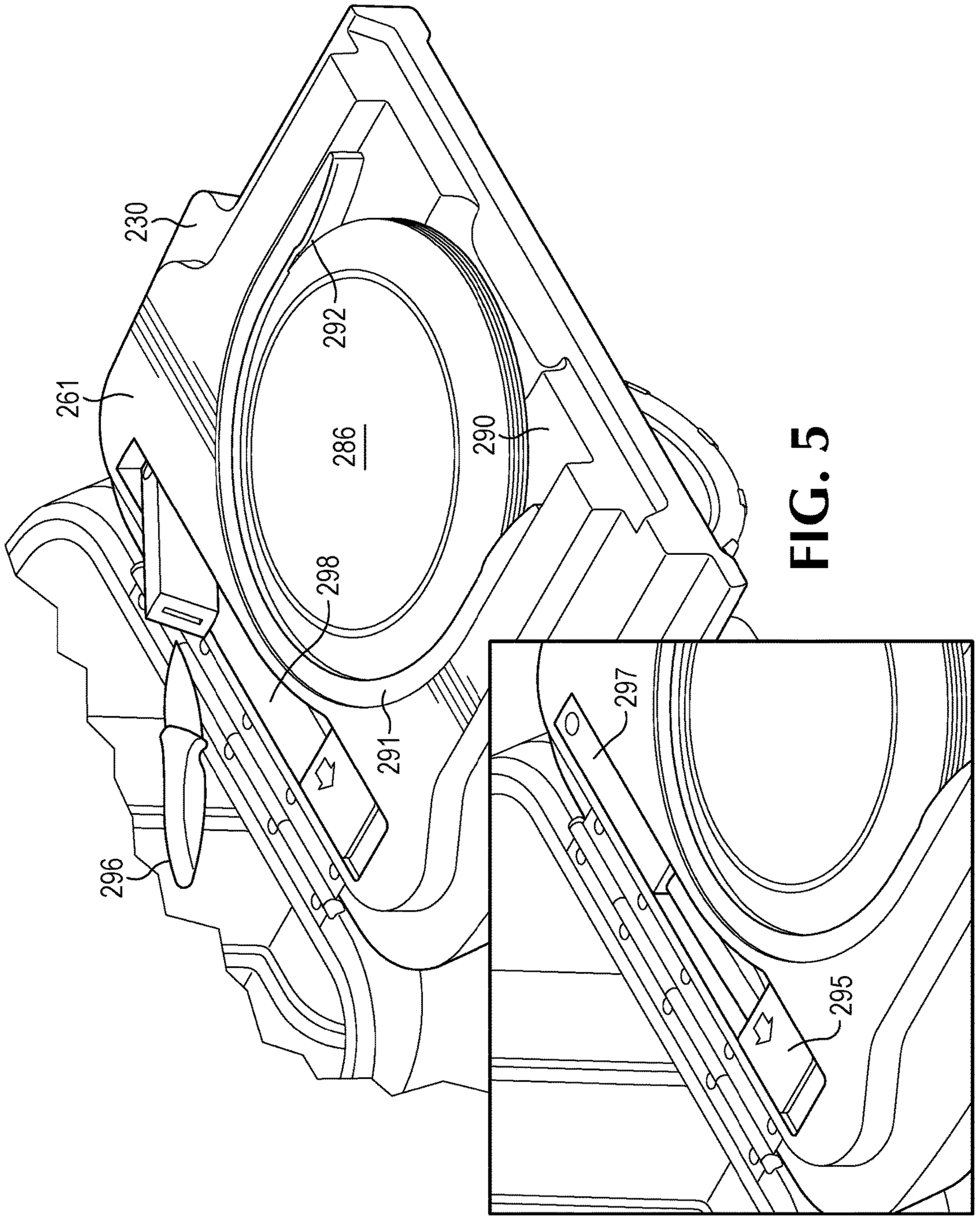


FIG. 5

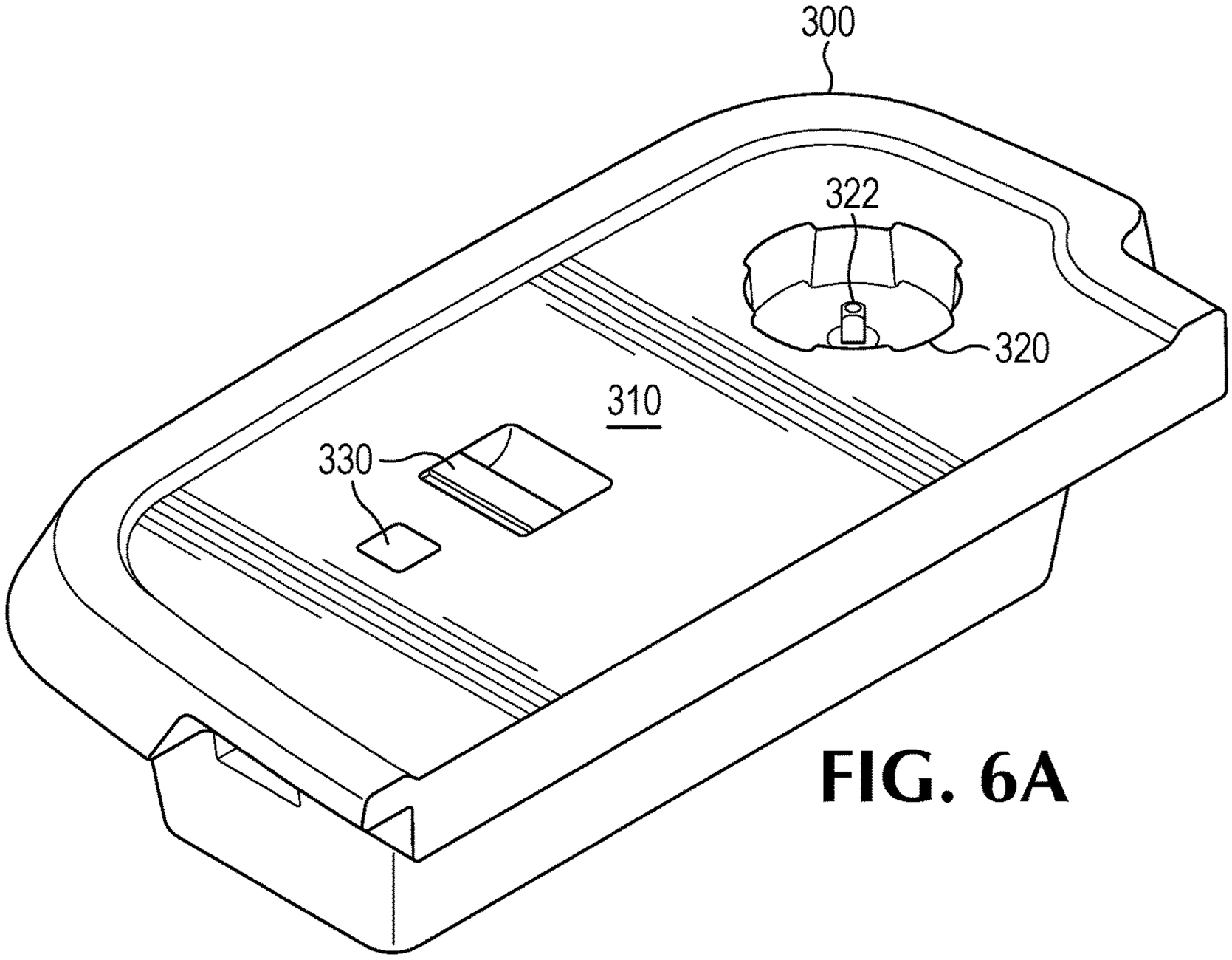
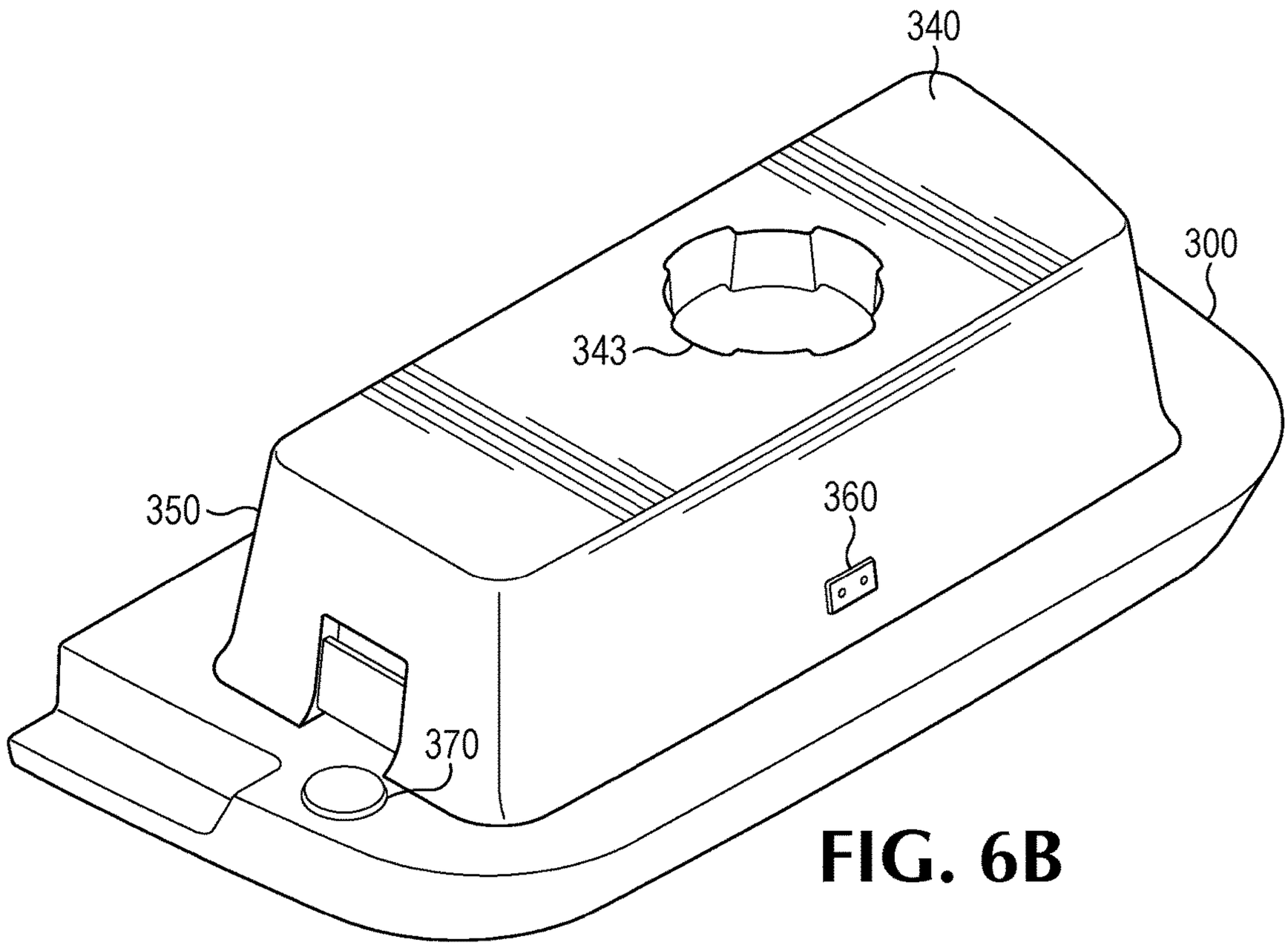


FIG. 6A



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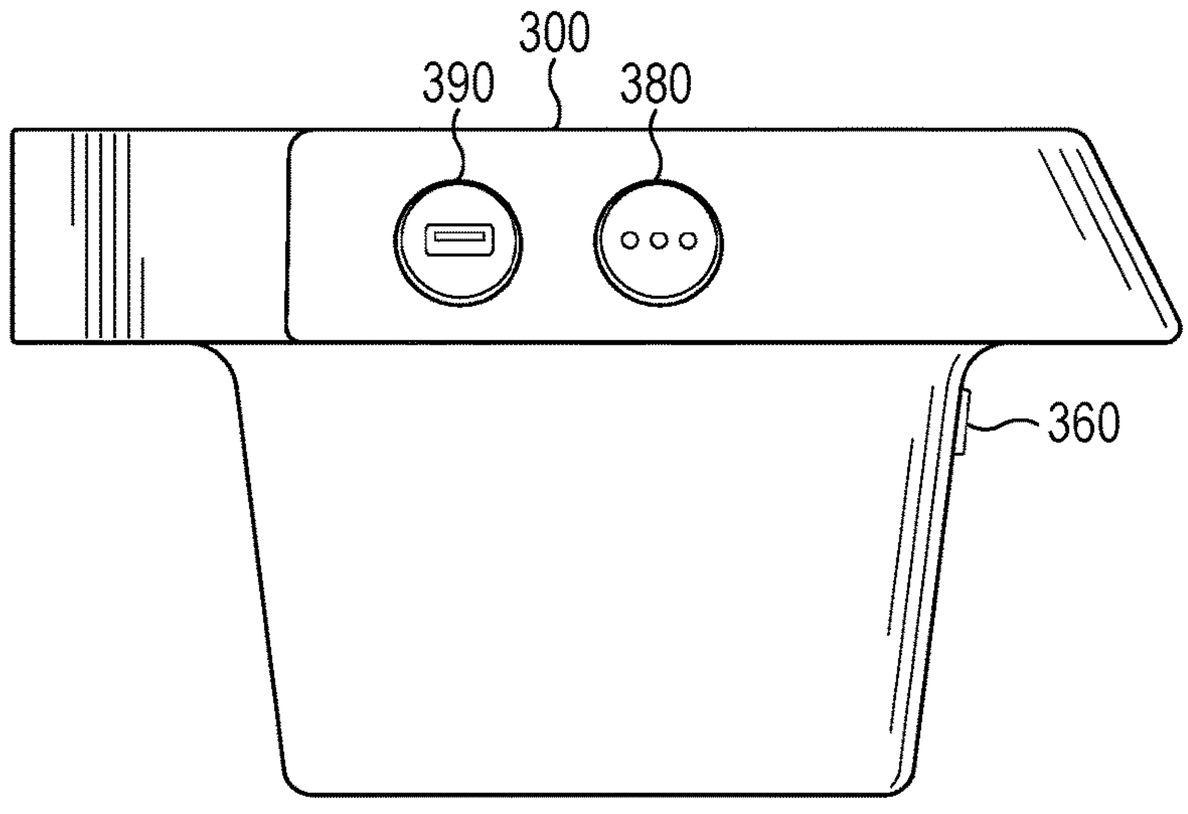


FIG. 6C

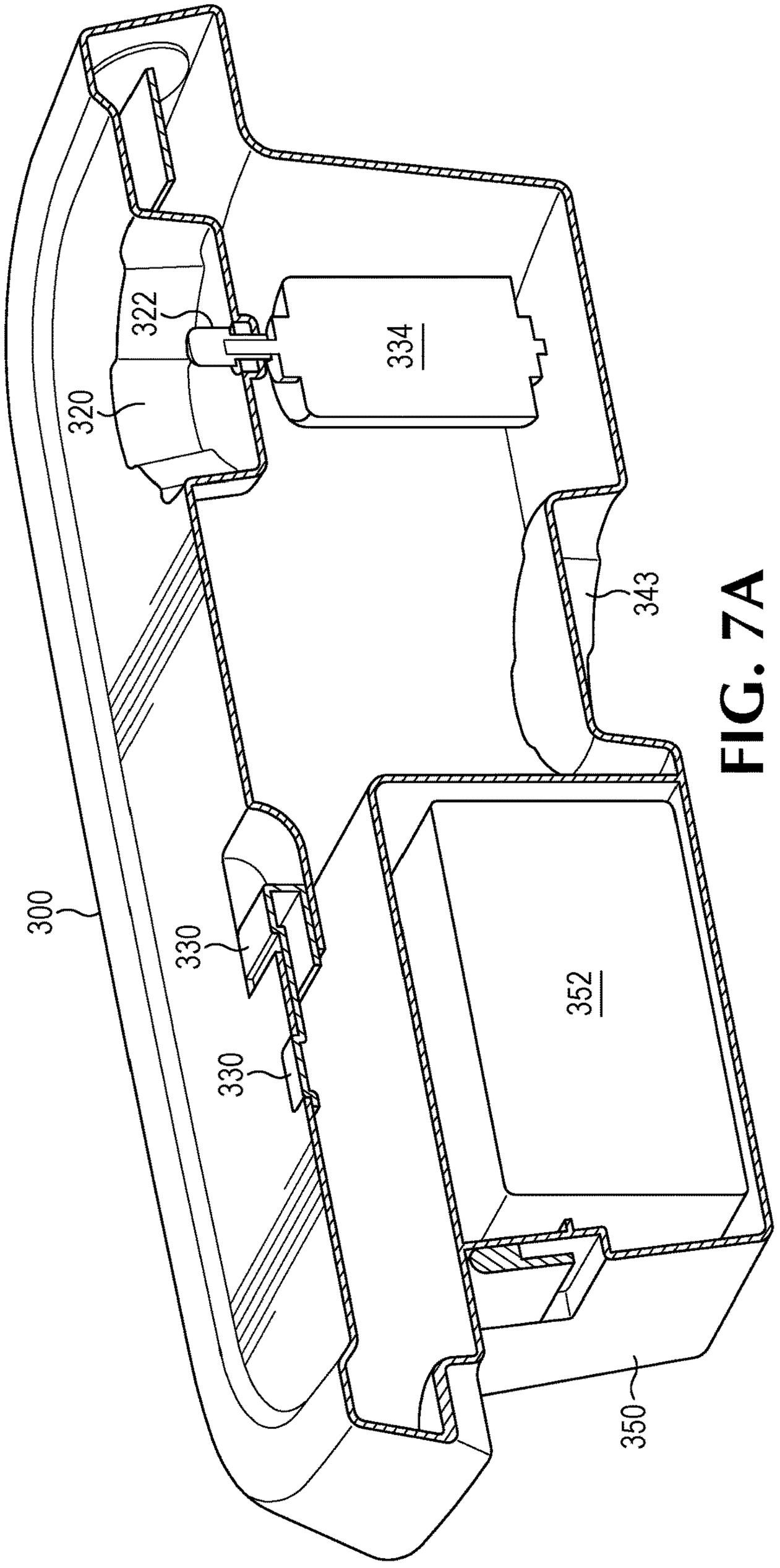


FIG. 7A

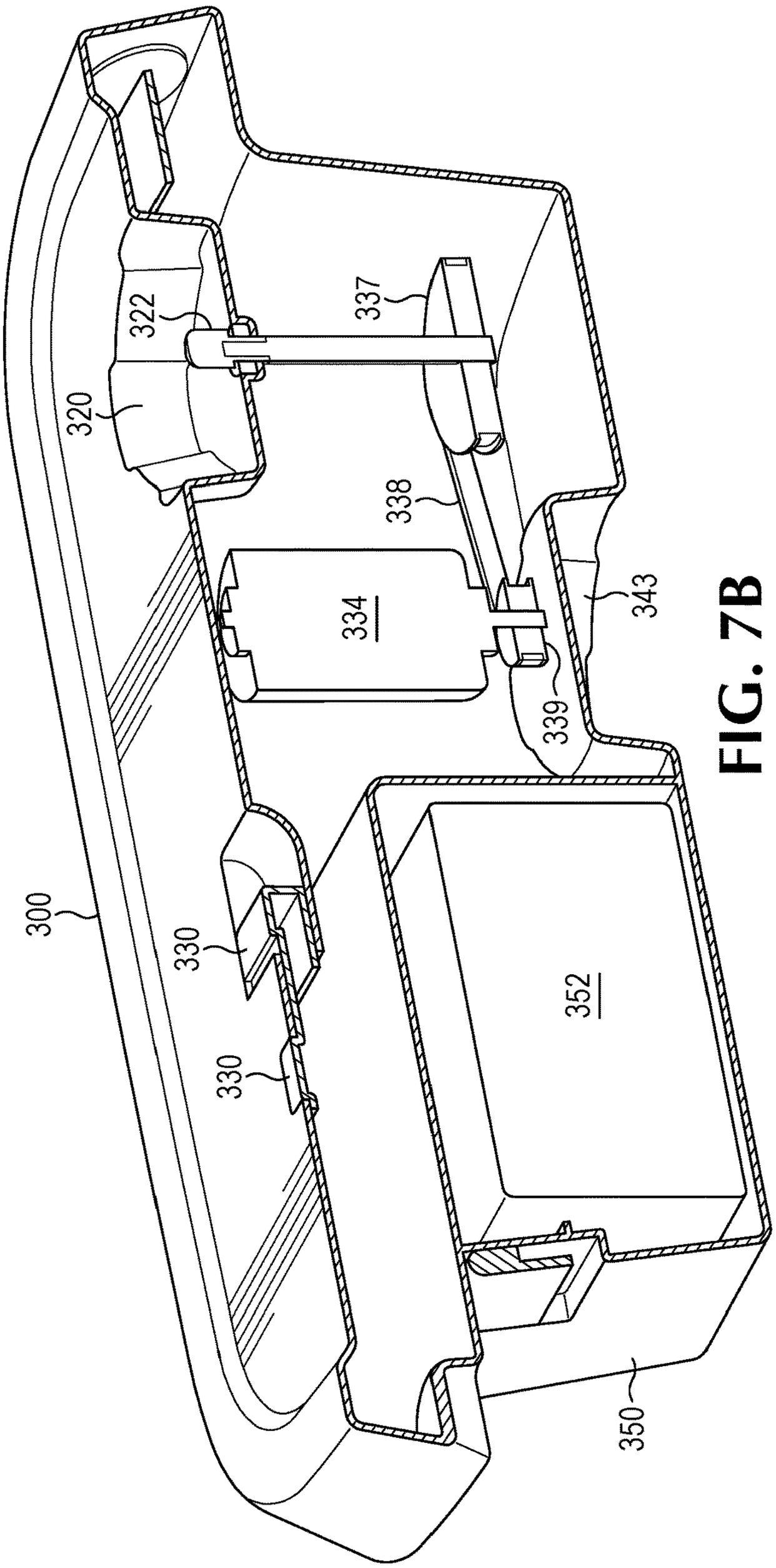


FIG. 7B

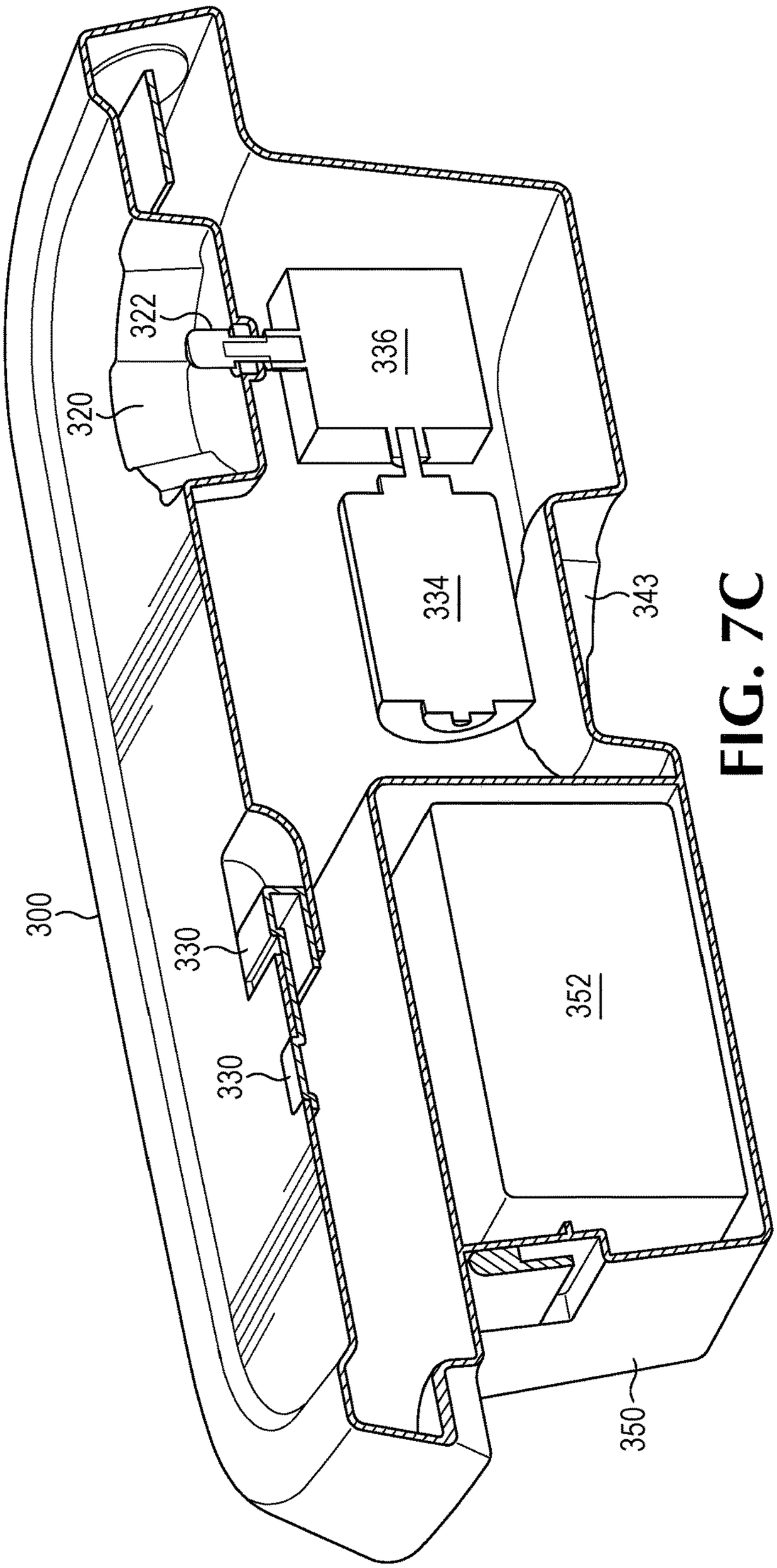


FIG. 7C

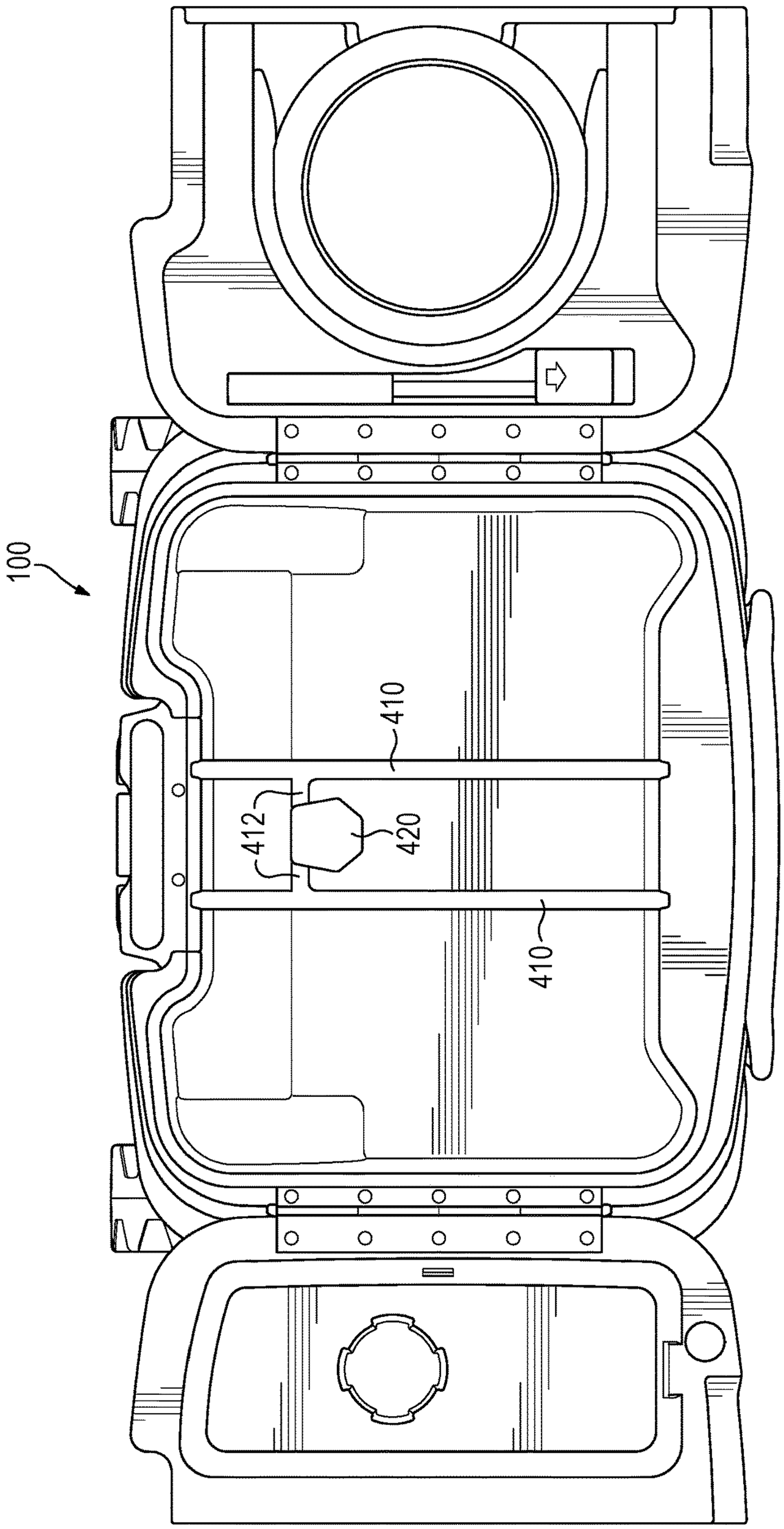


FIG. 8A

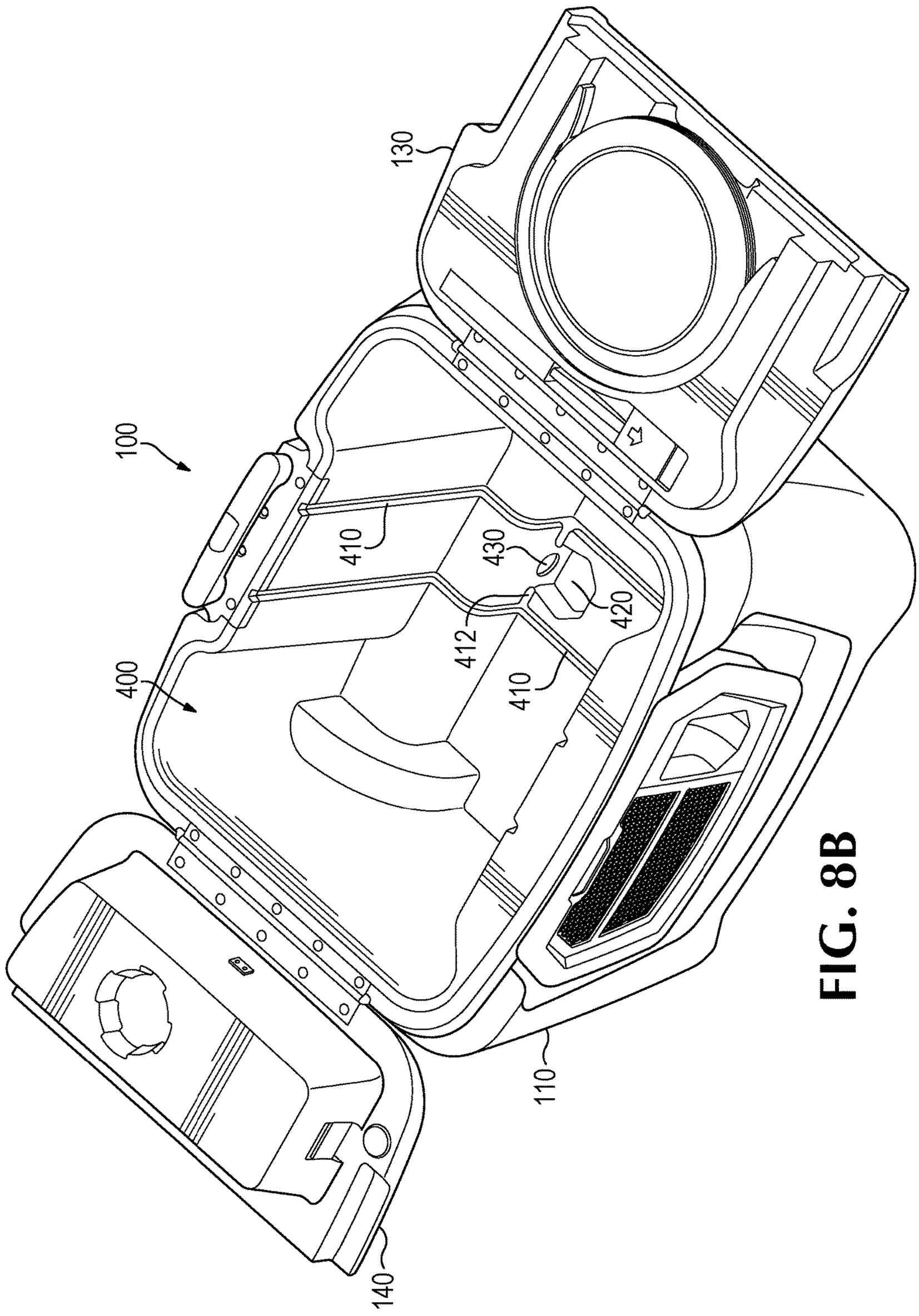


FIG. 8B

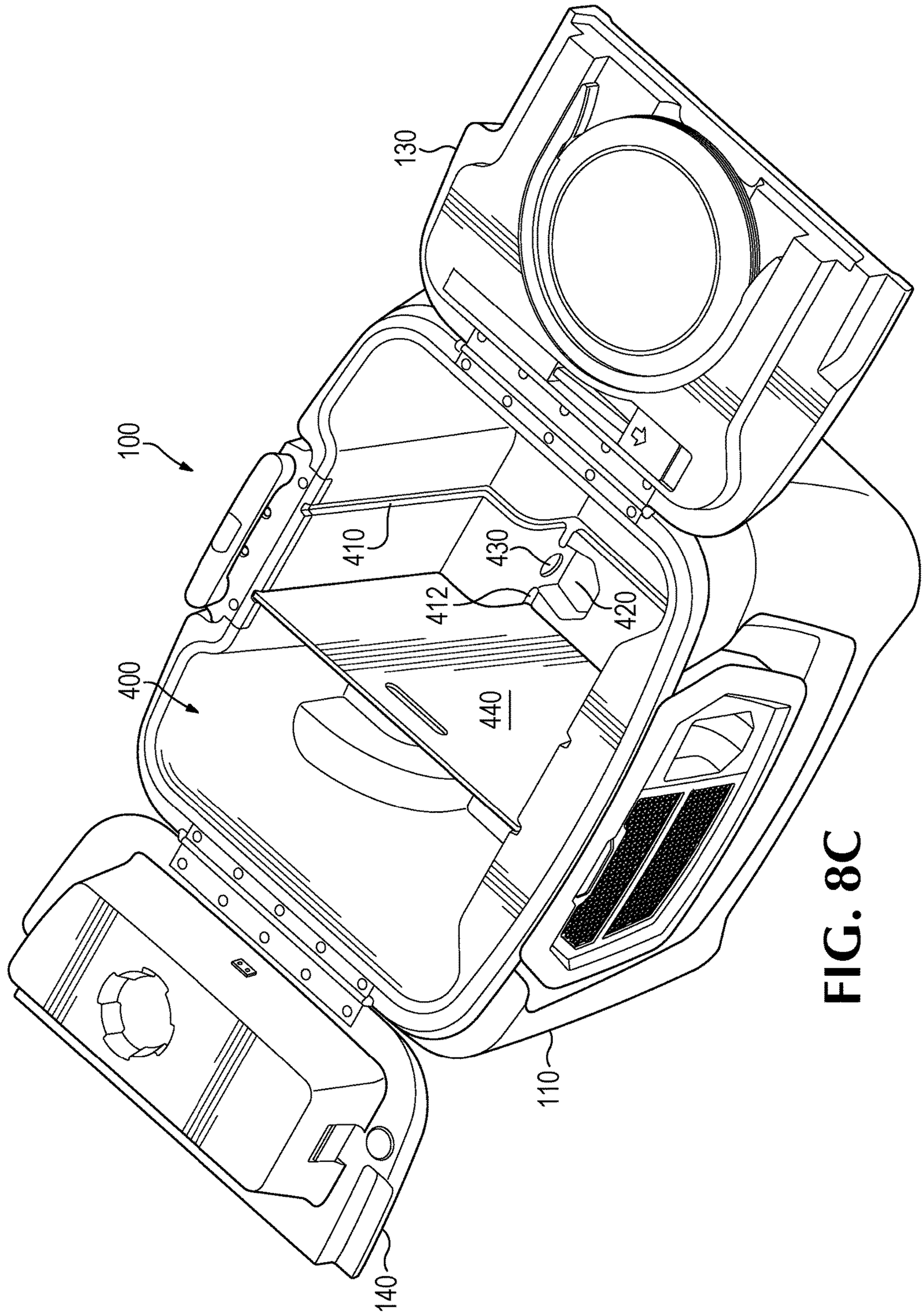
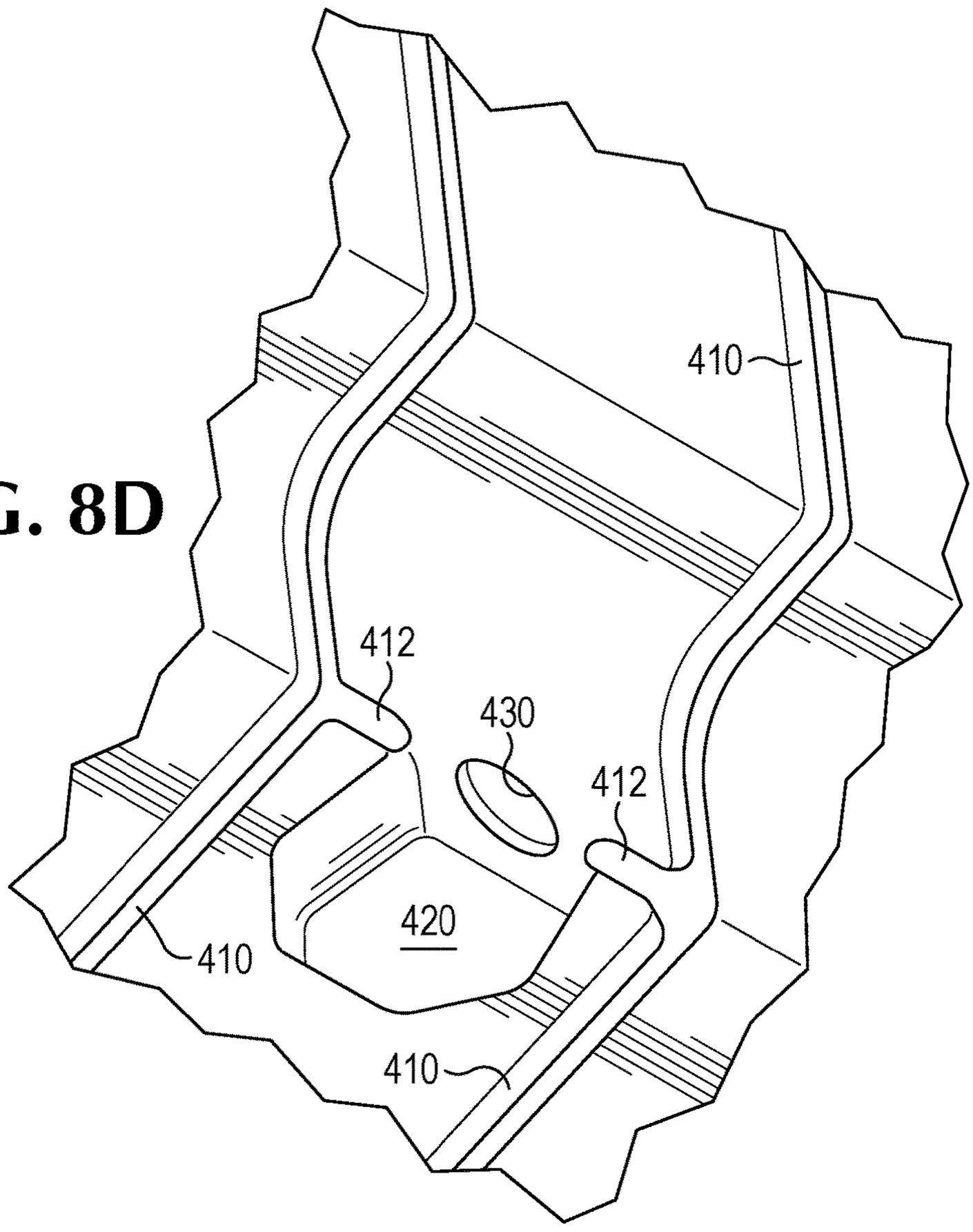


FIG. 8C

FIG. 8D



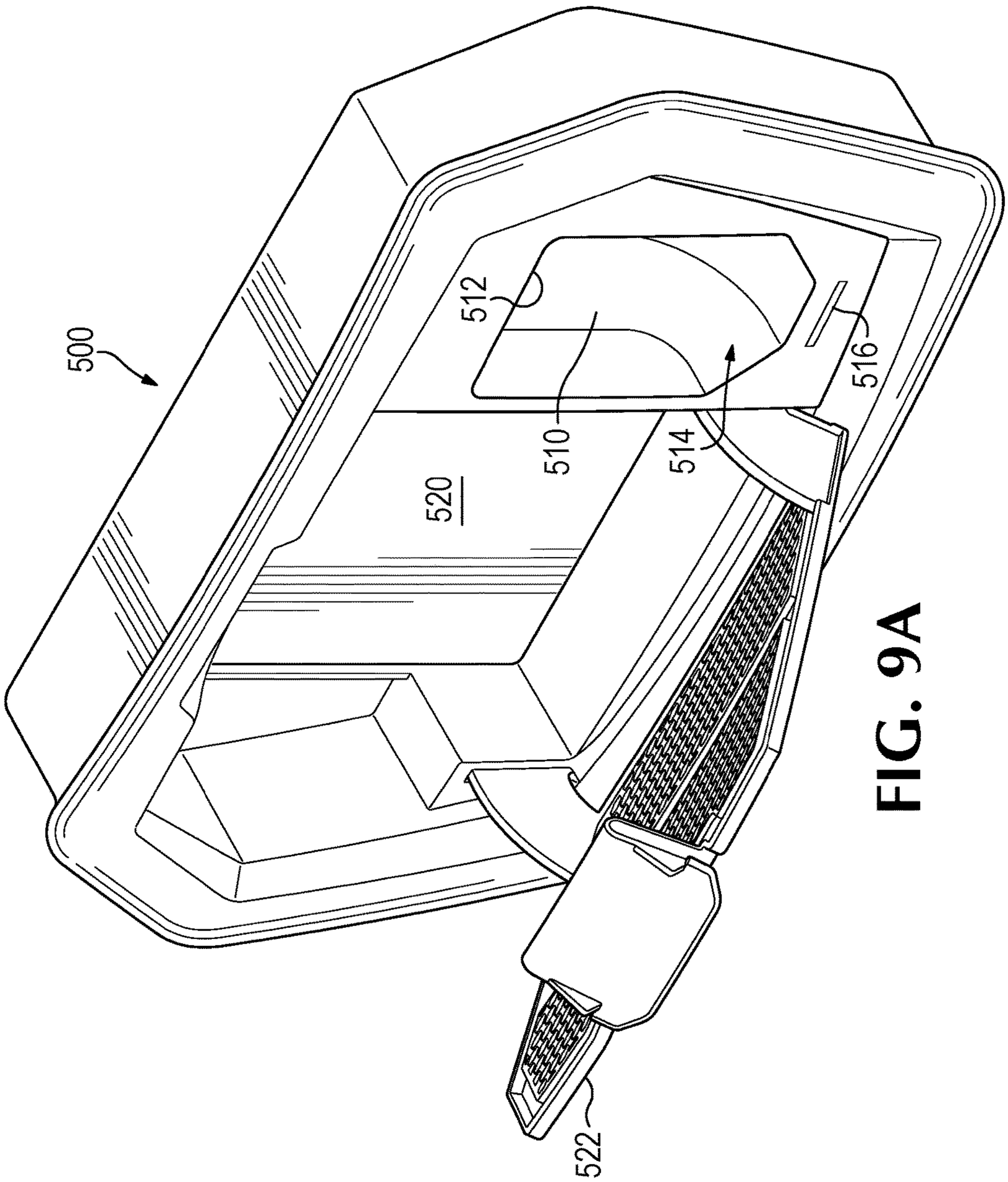


FIG. 9A

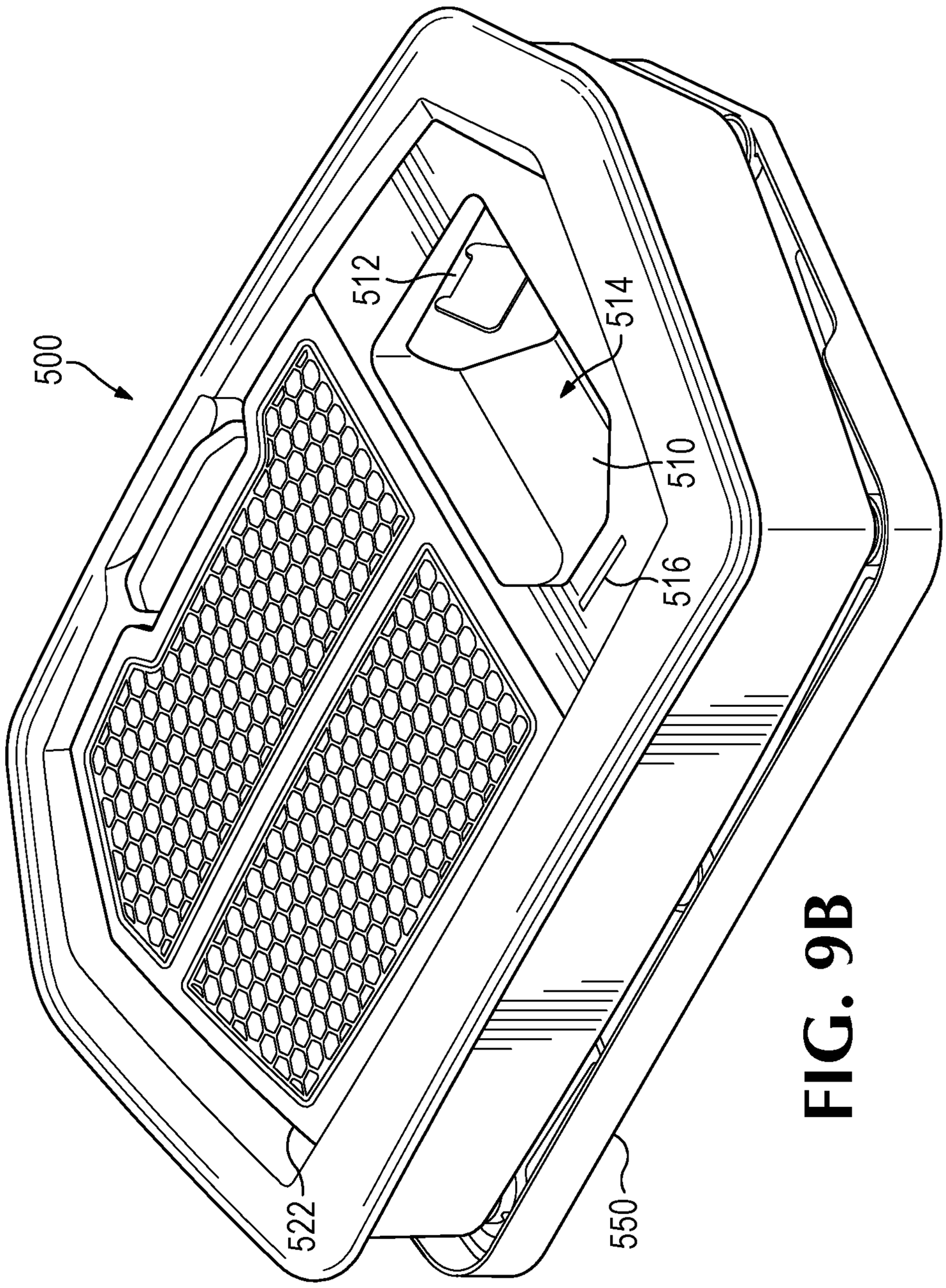


FIG. 9B

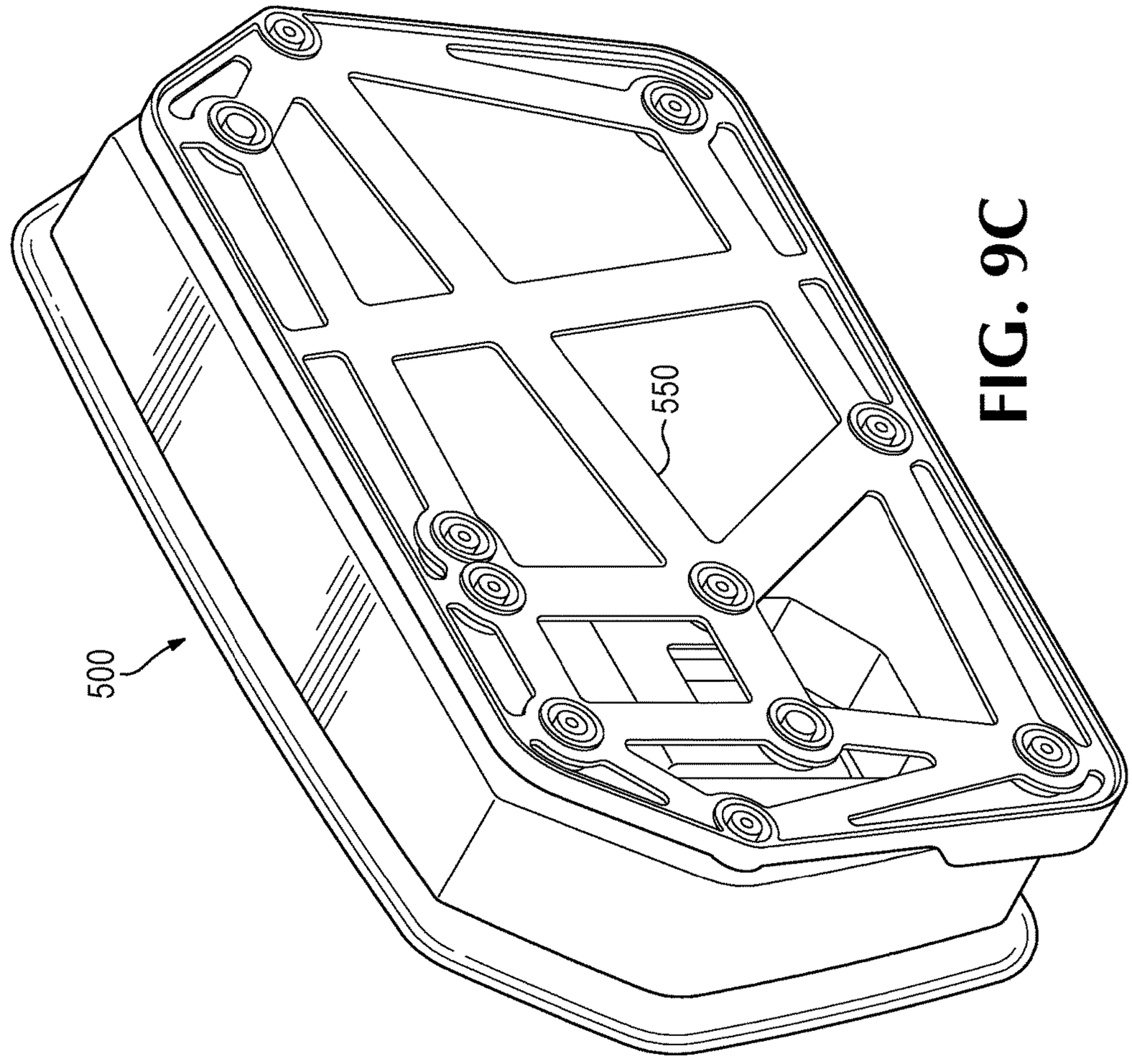


FIG. 9C

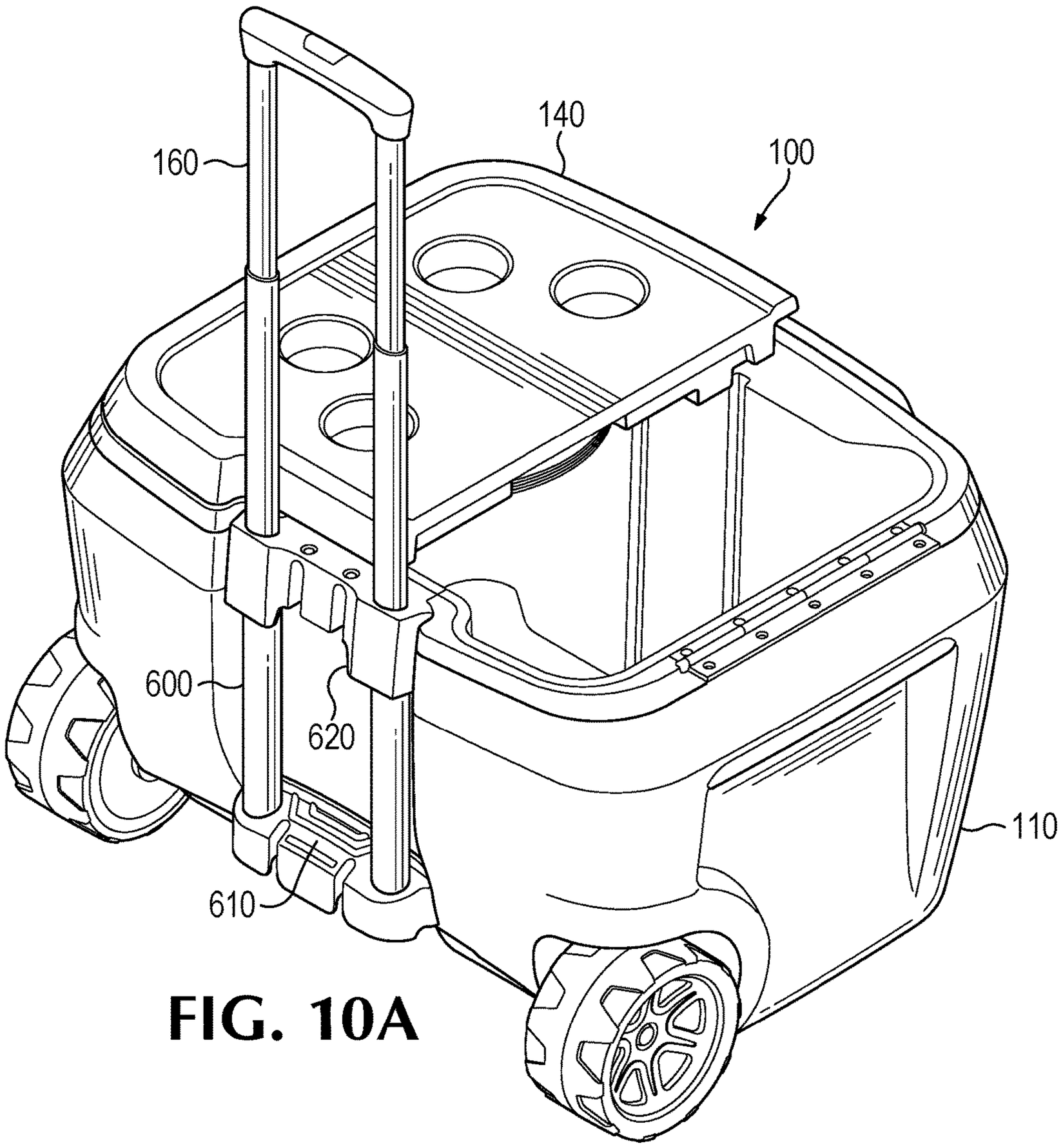


FIG. 10A

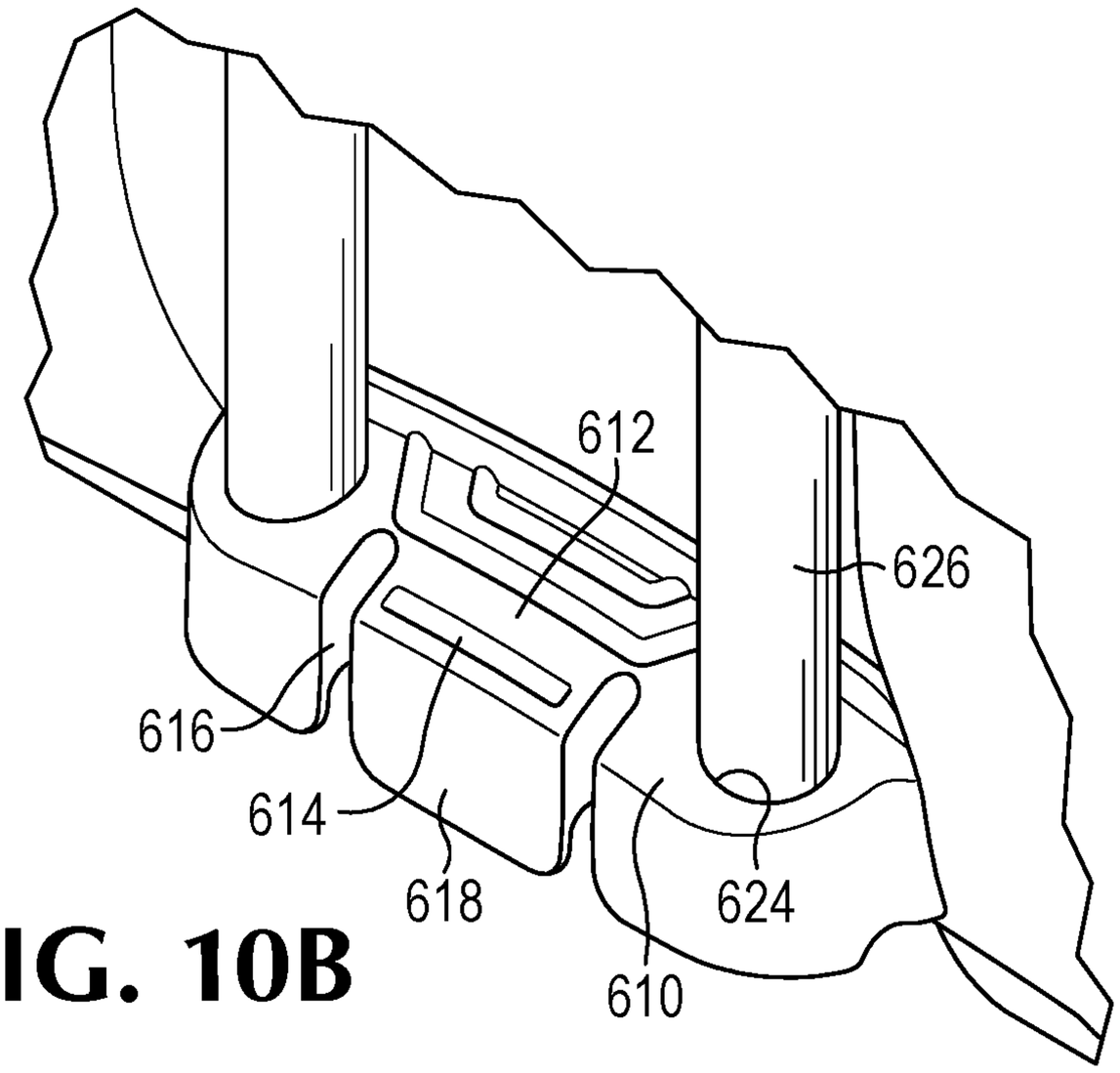


FIG. 10B

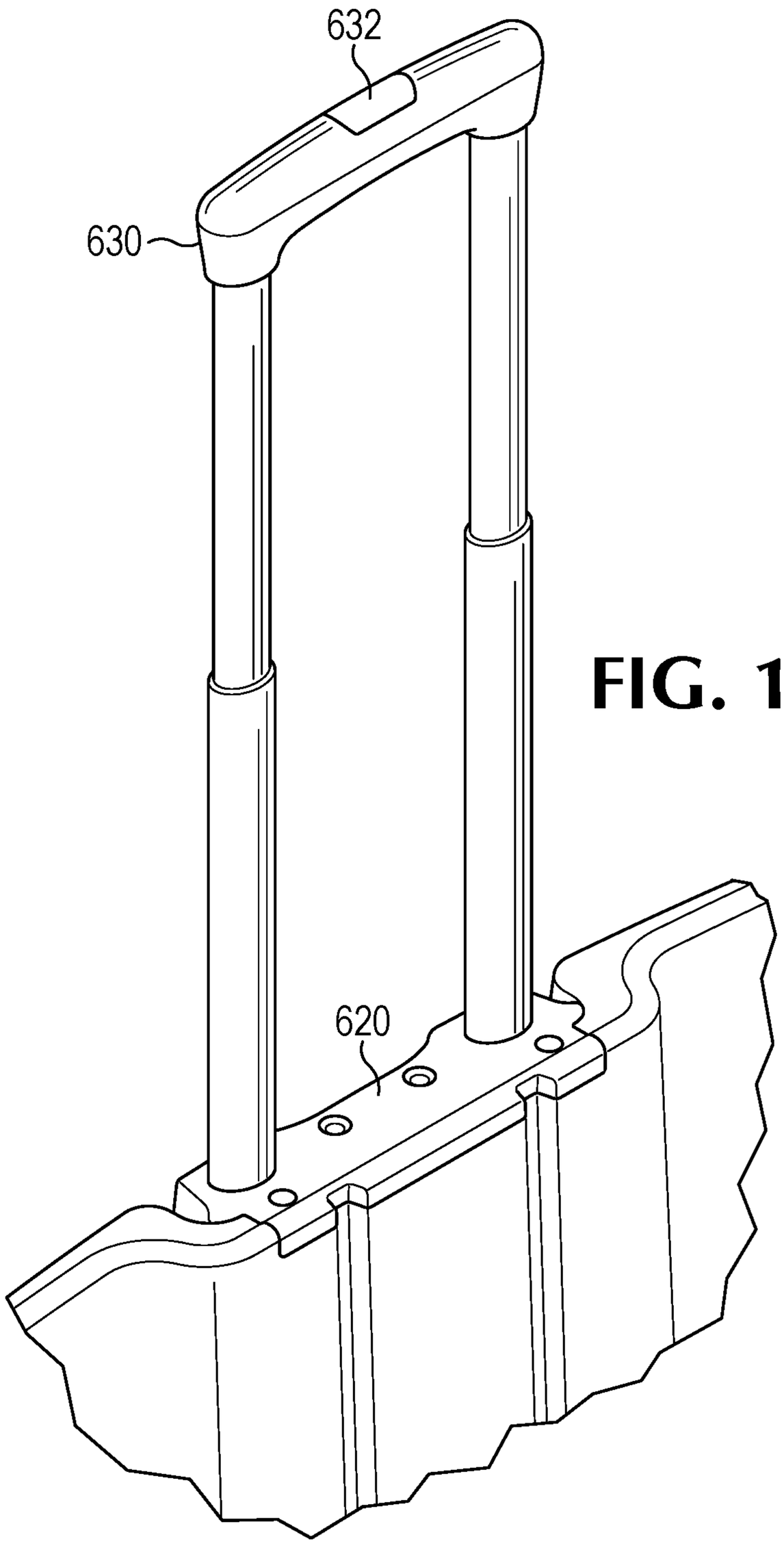


FIG. 10C

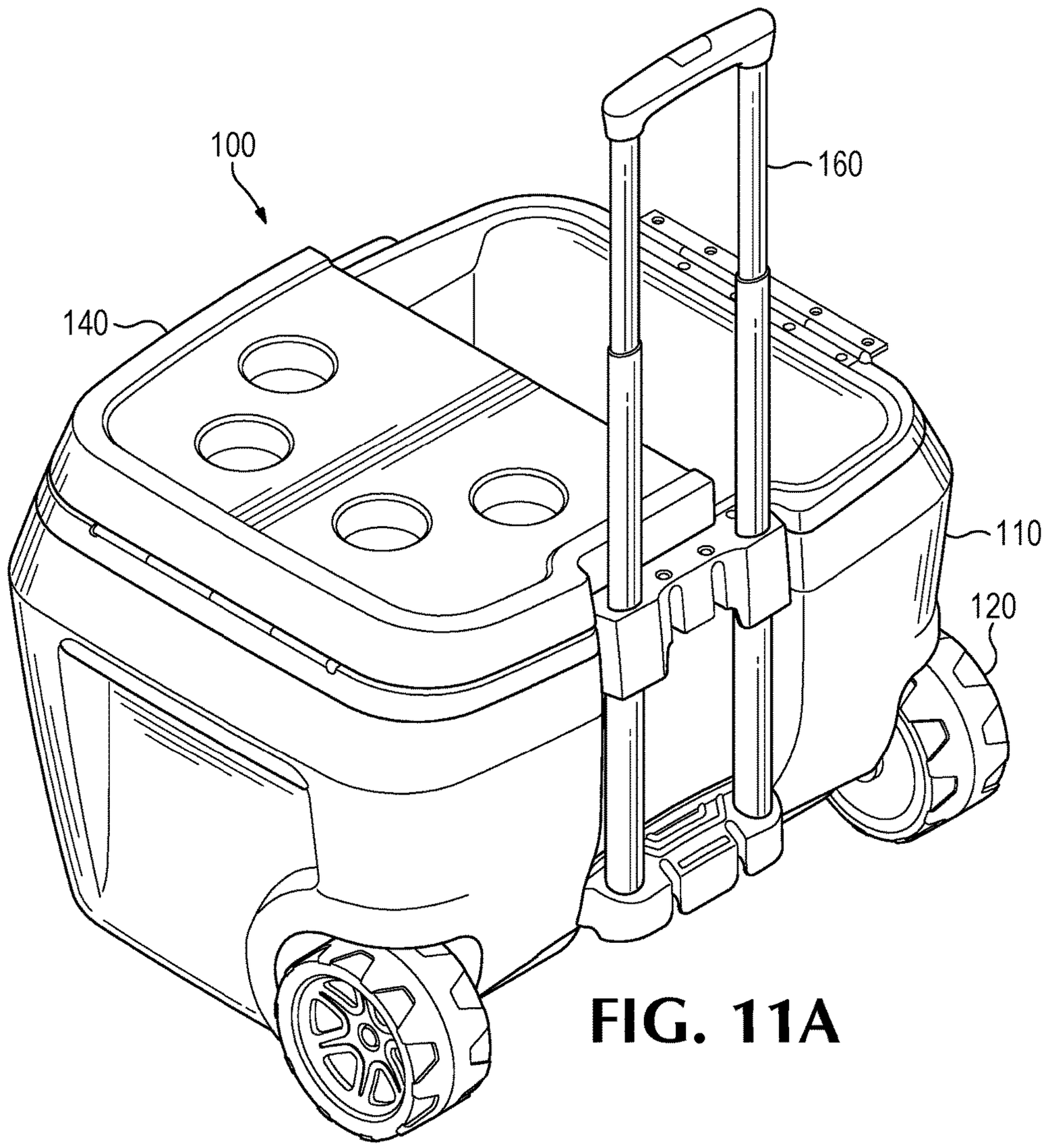


FIG. 11A

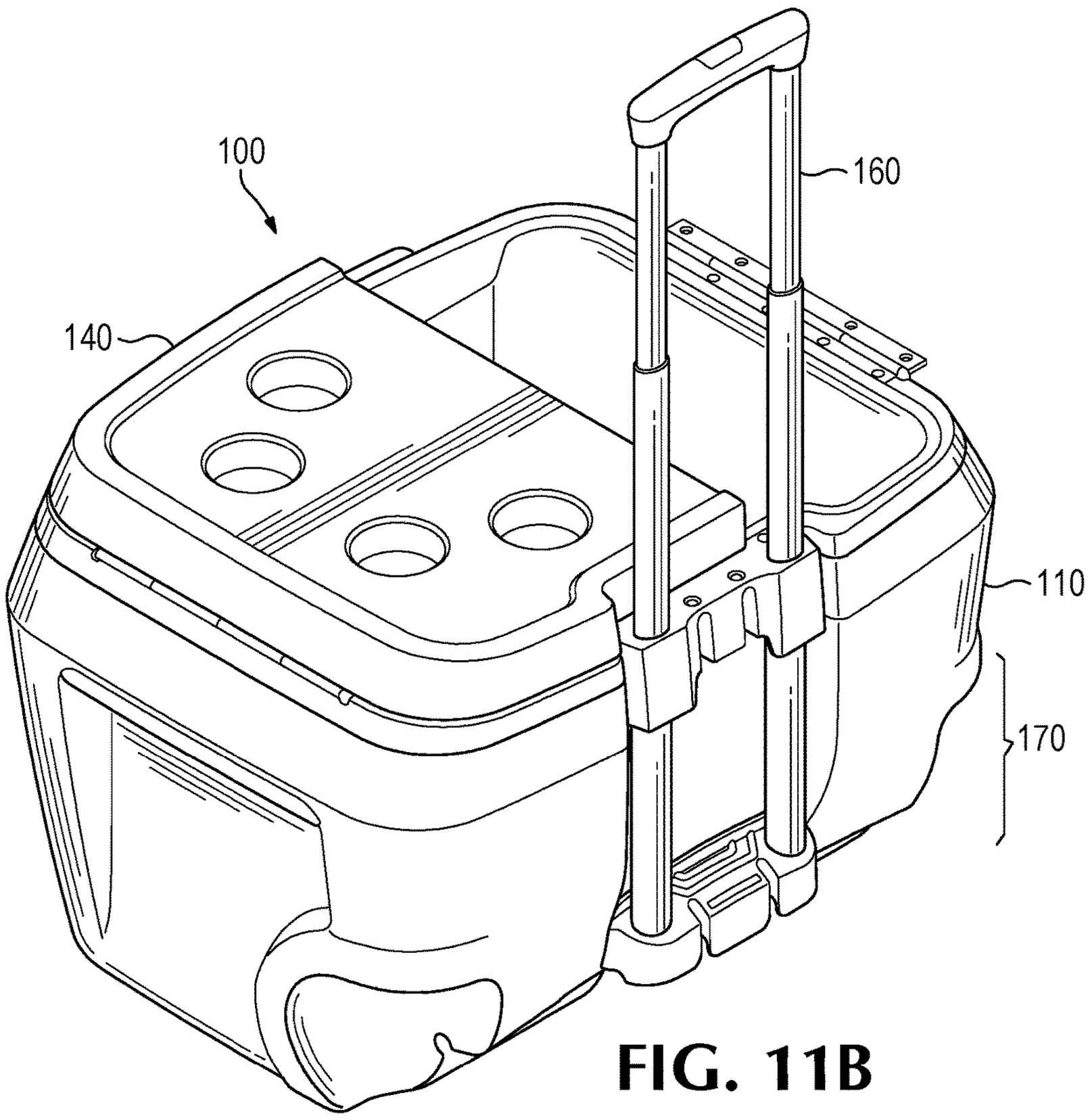


FIG. 11B

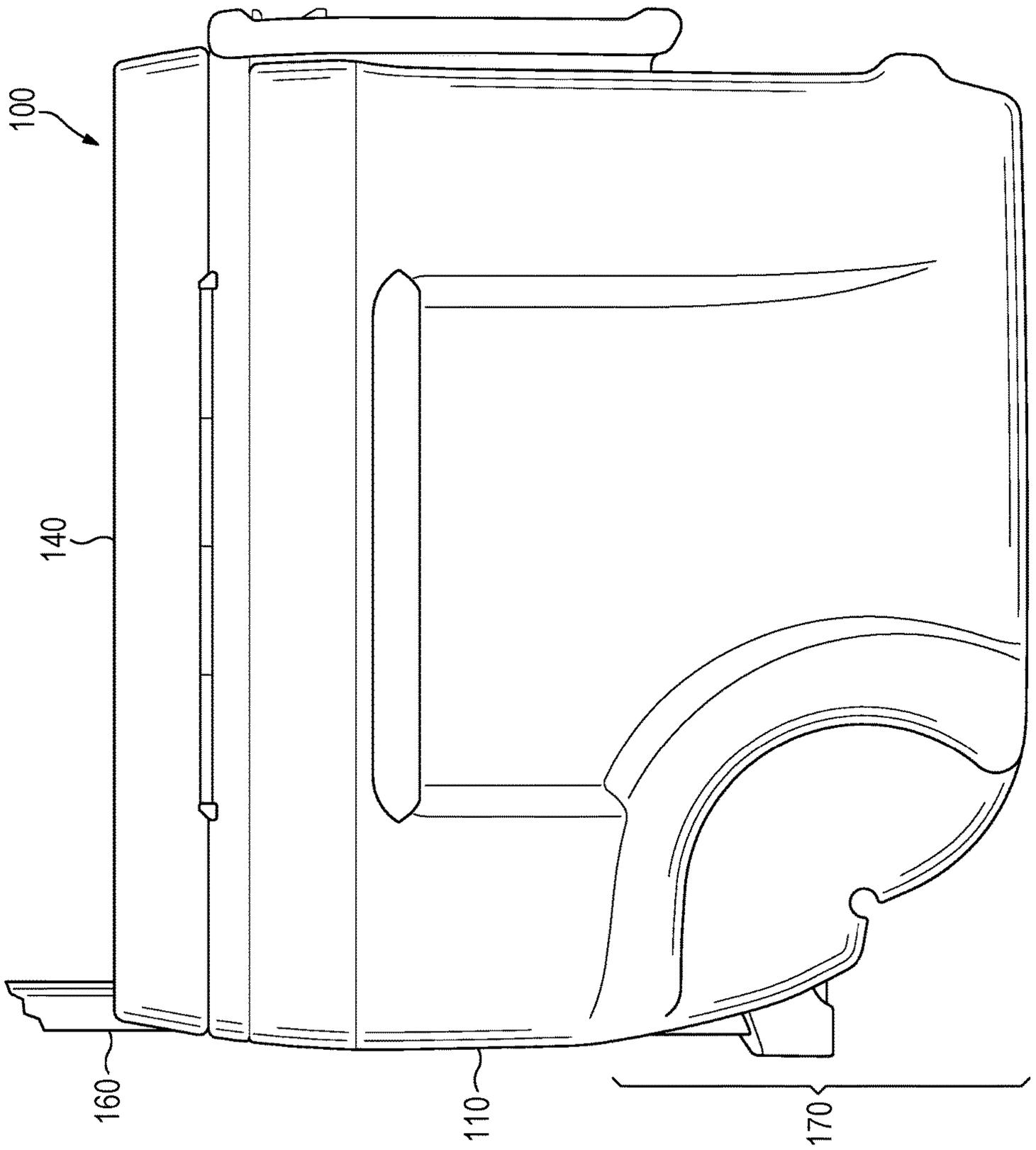


FIG. 11C

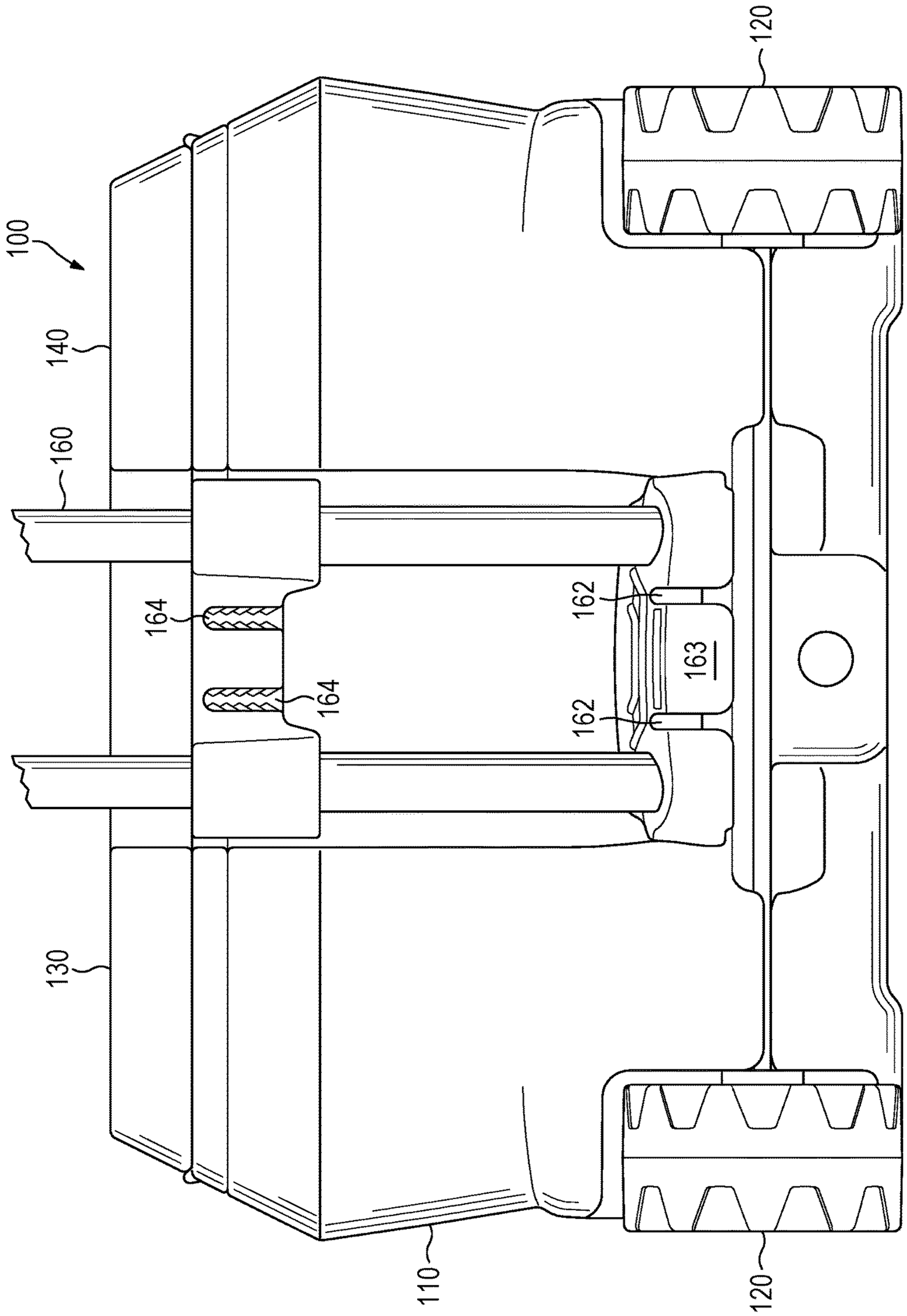


FIG. 12A

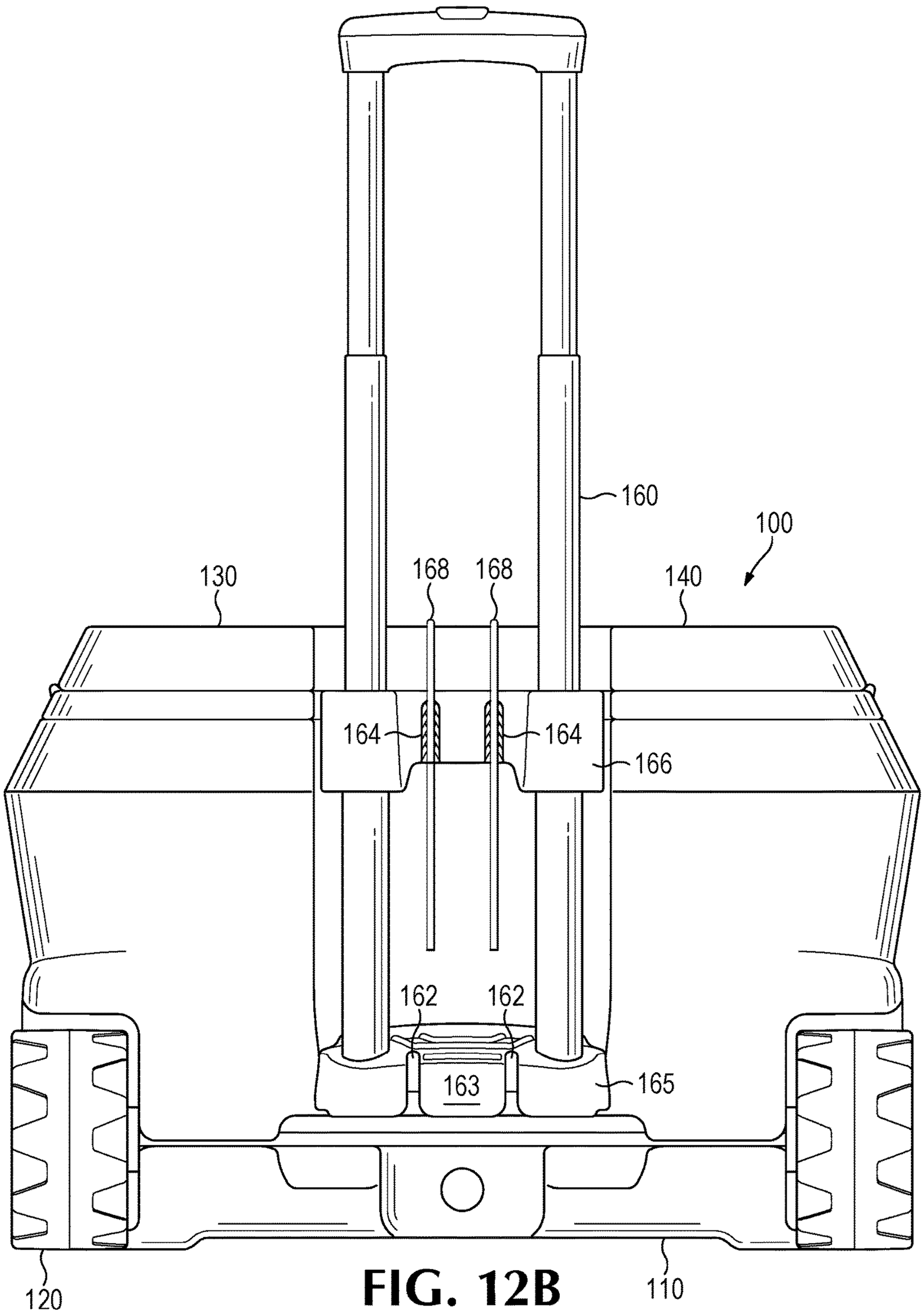


FIG. 12B

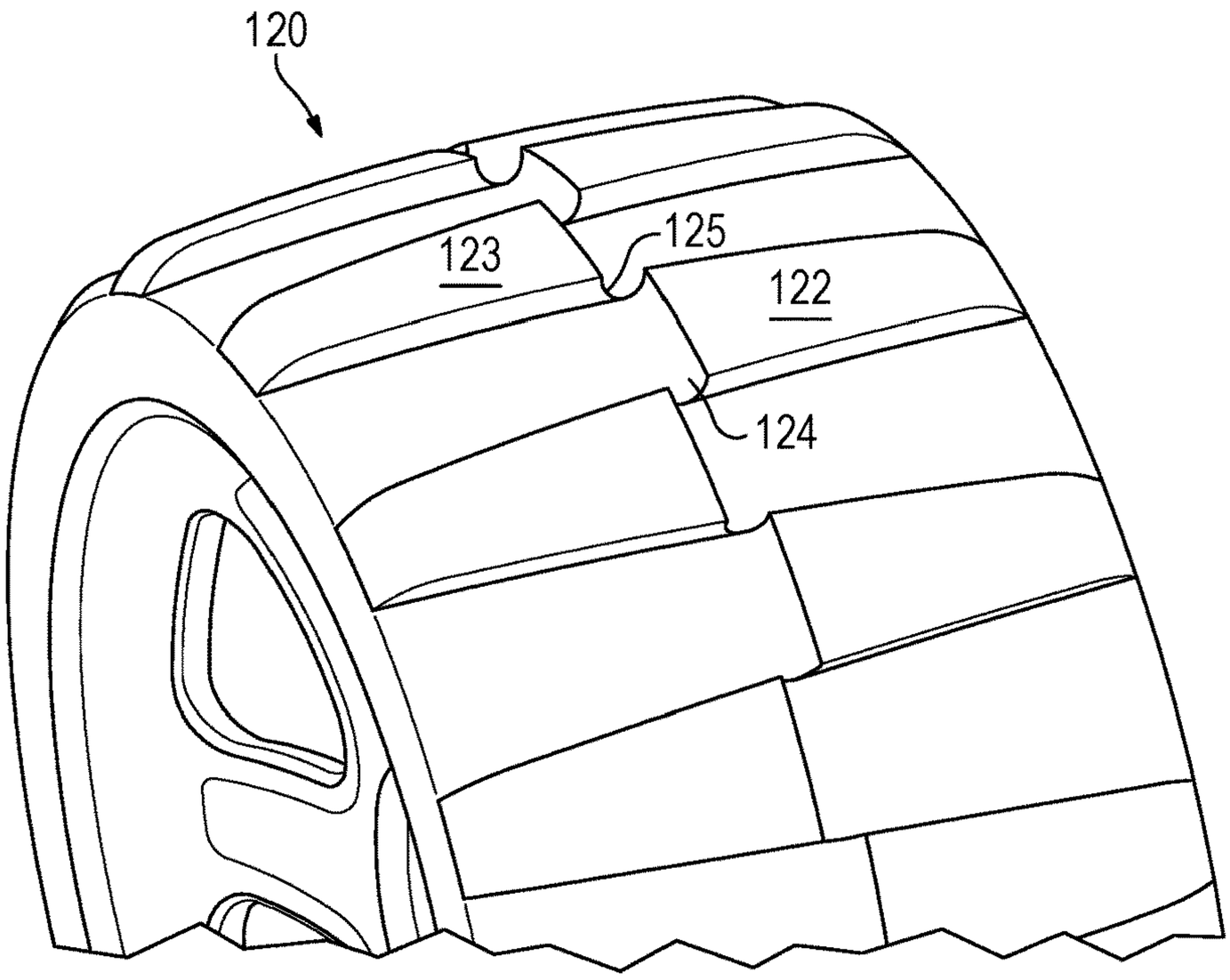


FIG. 13A

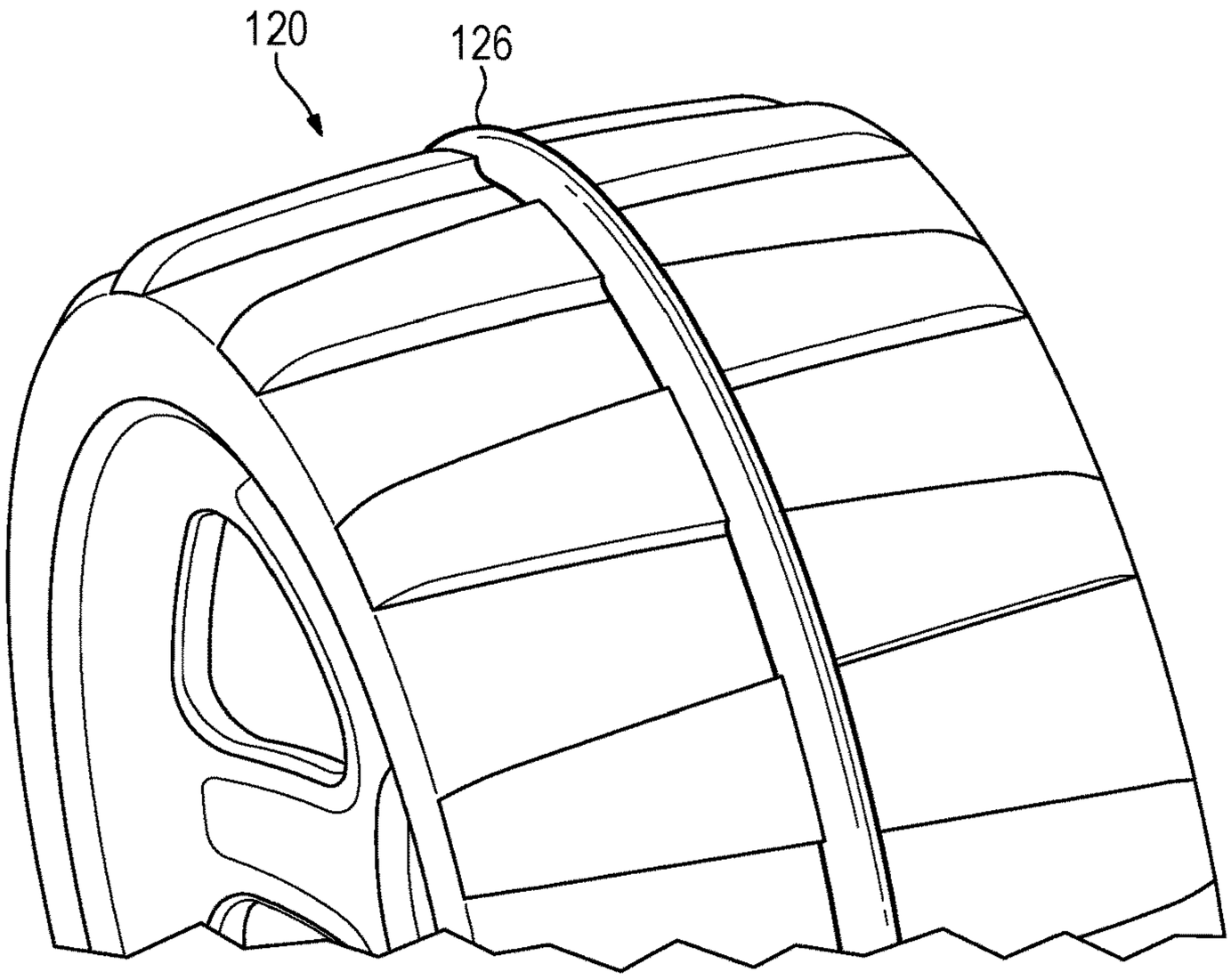


FIG. 13B

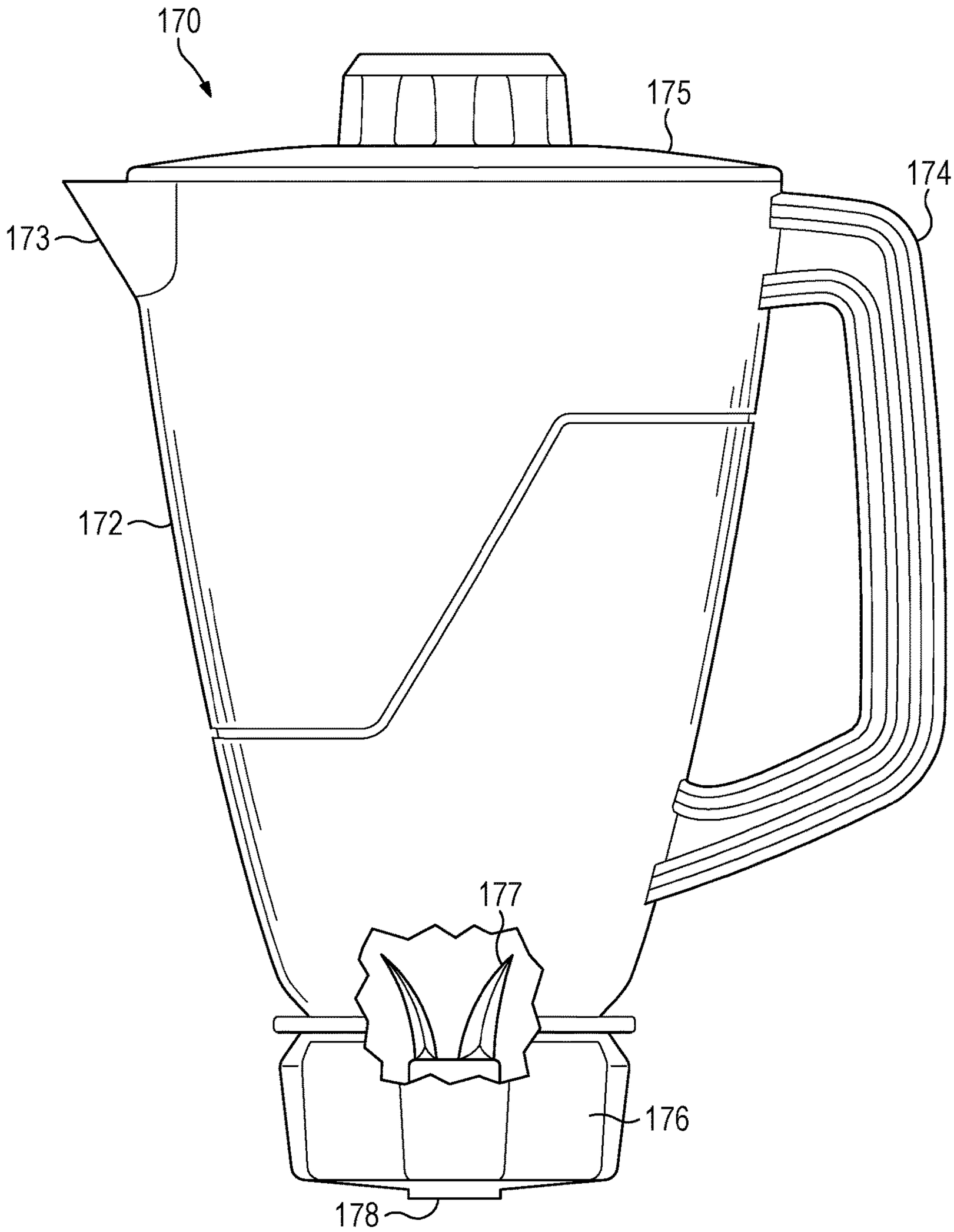


FIG. 14

COOLER HAVING INTEGRATED BLENDER AND ACCESSORIES

CROSS REFERENCE TO RELATED APPLICATIONS

This application is a continuation of and claims priority to co-pending U.S. patent application Ser. No. 14/530,541, titled "COOLER HAVING INTEGRATED BLENDER AND ACCESSORIES" and filed on Oct. 31, 2014, which claimed benefit from and is a non-provisional of U.S. Provisional Application 61/898,344, filed Oct. 31, 2013, entitled ICE CHEST WITH INTEGRATED BLENDER, the contents of which are incorporated by reference herein.

This application is related to U.S. patent application Ser. No. 14/530,543, titled "DRAG MINIMIZING COOLER" and filed on Oct. 31, 2014, and to U.S. patent application Ser. No. 14/530,551, titled "LID STRUCTURE FOR COOLER" and filed on Oct. 31, 2014, and to U.S. patent application Ser. No. 14/530,563, titled "COOLER HAVING INTEGRATED ACCESSORY STORAGE" and filed on Oct. 31, 2014, and to U.S. patent application Ser. No. 14/530,577, titled "COOLER DRAIN" and filed on Oct. 31, 2014, and to U.S. patent application Ser. No. 14/530,591, titled "COOLER WITH INTEGRATED PLATE STORAGE" and filed on Oct. 31, 2014, and to U.S. patent application Ser. No. 14/530,602, titled "COOLER HAVING BATTERY CHARGING SYSTEM" and filed on Oct. 31, 2014, all of which are commonly assigned with this application and are hereby fully incorporated by reference herein.

FIELD OF THE INVENTION

This disclosure is directed to a cooler with an integrated blender and more specifically relates to a cooler or ice chest with an integrated blender and other accessories to create a unified product.

BACKGROUND

Present coolers or ice chests come in a variety of shapes and sizes. Coolers, generally, are formed with an insulated shell around a hollow cavity or storage section to store items desired to be kept cool. Items to be kept cool are placed along with a cold source, typically ice or cold packs, within the storage section. Coolers are generally portable and include handles for lifting. Some coolers include integrated wheels to facilitate transport.

A problem exists in that, once loaded, present coolers are very hard to move. Coolers without wheels must be carried, and items stored within the storage section add to the weight of the cooler itself to become a large, heavy, bulky apparatus. For many outings, a cooler is only one part of the gear carried to the destination. For some destinations the cooler may simply be placed in a car or truck and driven to the destination. Some destinations, however, like a beach, park, remote campsite or boat, do not typically provide an easy way to transport a cooler in a vehicle to the final destination, so the cooler must be carried or dragged. Coolers with wheels often suffer from poor design, construction, or material choice and are a constant source of frustration. Wheels that may properly operate on the flat, level floor of a store tend to sink in soft ground, such as sand or a forest trail. Loading a cooler with heavy items exacerbates the problem.

Further, a cooler may only be one of a number of items desired at the destination. Many people enjoy comforts brought from home when at a destination, such as chairs, blankets, and sporting devices such as Frisbees and paddleballs. Transporting such items may be difficult, especially when traveling with small children who cannot carry heavy, bulky, or a multitude of items.

Another limitation of present coolers is that they only store pre-made drinks, and therefore limit the types of drinks that may be enjoyed at the destination.

Embodiments of the invention address these and other issues in the prior art.

SUMMARY OF THE DISCLOSURE

Aspects of the invention are directed to a portable cooler, including an insulated body defining a main interior storage space and a lid structured to at least partially cover the main interior storage space and having an integrated blender or an integrated blender drive.

In other aspects, the integrated blender may include a source of electrical power, an electric motor coupled to the source of electrical power, a blender spindle mounted through a surface of the lid and coupled to the electric motor. The integrated blender may also include a blender jar structured to hold food items for blending and one or more blending blades disposed at a bottom of an inside of the blender jar that are structured to engage with the blender spindle.

In some aspects, the portable cooler may include a blender recess shaped in a negative mold of a collar of the blender jar. In some aspects the portable blender includes a lockout switch within the blender recess. In some embodiments the lid of the portable cooler may include one or two recesses.

The electrical power in the cooler may be a battery and the motor is a DC electric motor coupled to the battery. Some embodiments may include a switch or safety switch.

In some aspects the electric motor is directly coupled to the blender spindle, while in other aspects the motor and spindle are both connected to a transmission.

Other aspects of the invention include a portable cooler that includes an insulated body including a main interior and a lid that at least partially covers the main interior. The lid may include a battery receiver for receiving a battery through an access door and storing it within, a DC electric motor that can be coupled to such a battery and a blender spindle connected to the electric motor, or connected through a transmission to the electric motor.

In some aspects the invention is directed toward a lid for a portable cooler that includes a motor coupled to a blender drive and a power source for the motor.

Other aspects include a portable blender that has a storage container structured to contain ice and a storage container lid for at least partially covering the storage container. In such aspects, the storage container lid includes a DC electrical source, a DC motor coupled to the electrical source, a blender spindle coupled to the DC motor and structured to spin when the DC motor spins, a blender jar structured to hold food items for blending, and one or more blending blades disposed at a bottom of an inside of the blender jar and structured to engage with the blender spindle.

Yet other aspects of the invention include an electrical network for a portable cooler contained within a lid of the portable cooler. Such an electrical network may include an energy source; a motor coupled to the energy source; a motor switch coupled between the energy source and the motor and structured to selectively cause an electrical circuit to be formed between the motor and the energy source to spin the motor; a light source coupled to the energy source; a light switch coupled between the energy source and the

light source and structured to selectively cause an electrical circuit to be formed between the light source and the energy source to illuminate the light source.

In some embodiments, the energy source of the electrical network is a rechargeable battery, which also may include an indicator to generate a signal indicative of a state of charge of the rechargeable battery.

Other aspects of the electrical network include a recharging port coupled to the energy source for charging a device separate from the portable cooler from the energy source of the portable cooler through the recharging port.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. **1**A and **1**B are front and perspective views, respectively, of a cooler including an integrated blender and other accessories according to embodiments of the invention.

FIGS. **2**A and **2**B are front and perspective views, respectively, of the cooler of FIGS. **1**A and **1**B illustrating the integrated blender mounted thereon.

FIGS. **3**A, and **3**B are front views illustrating operation of lids of the cooler illustrated in FIGS. **1**A and **1**B.

FIG. **3**C is a perspective view illustrating operation of lids of the cooler illustrated in FIGS. **1**A and **1**B.

FIGS. **4**A and **4**B are front and perspective views illustrating additional detail of the lids of the cooler illustrated in FIGS. **1**A and **1**B.

FIG. **5** is a perspective view of a top lid for use with the cooler illustrated in FIGS. **1**A and **1**B.

FIGS. **6**A and **6**B are perspective views of a top surface and bottom surface, respectively, of the second lid of the cooler illustrated in FIGS. **1**A and **1**B.

FIG. **6**C is an end view of the second lid of the cooler illustrated in FIGS. **1**A and **1**B including additional features according to embodiments of the invention.

FIGS. **7**A, **7**B, and **7**C are cross-sectional views of the second lid of the cooler illustrated in FIGS. **1**A and **1**B illustrating various internal components and controls.

FIGS. **8**A and **8**B are a top view and perspective view illustrating an interior space of the cooler illustrated in FIGS. **1**A and **1**B according to embodiments of the invention.

FIG. **8**C is a perspective view of the interior space illustrated in FIGS. **8**A and **8**B further including illustration of an integrated cutting board according to embodiments of the invention.

FIG. **8**D is a perspective view of the interior space illustrated in FIGS. **8**A and **8**B showing additional detail according to embodiments of the invention.

FIGS. **9**A, **9**B, and **9**C are perspective views of an accessory storage unit built in or attached to the cooler illustrated in FIGS. **1**A and **1**B.

FIGS. **10**A, **10**B, and **10**C are perspective views illustrating a handle **600** integrated into the cooler illustrated in FIGS. **1**A and **1**B according to embodiments of the invention.

FIGS. **11**A and **11**B are perspective diagrams illustrating an external shape of a rear portion of the cooler illustrated in FIGS. **1**A and **1**B according to embodiments of the invention, and FIG. **11**C is a side view diagram illustrating the same.

FIGS. **12**A and **12**B are rear views of the cooler **100** illustrated in FIGS. **1**A and **1**B according to embodiments of the invention.

FIGS. **13**A and **13**B illustrate additional features of the wheels that may be attached to the cooler of FIGS. **1**A and **1**B.

FIG. **14** is a side view of an example blender for use with the cooler **100** illustrated in FIGS. **1**A and **1**B according to embodiments of the invention.

DETAILED DESCRIPTION

Turning now descriptively to the drawings, in which similar reference characters denote similar elements throughout the several views, FIG. **1**A is a front view of a cooler **100** according to embodiments of the invention. FIG. **1**B is a perspective view of the cooler **100**. In general, in this embodiment, the cooler **100** includes a cooler body **110**, one or more wheels **120**, a first and second lid **130**, **140**, an accessory housing unit **150**, and a handle **160**. Each of these items is described in detail below.

The cooler **100** is an insulated storage area in which food or beverage items may be stored and transported while remaining cold. A cooler body **110** is preferably generally rectangular in shape, although the cooler body may also be square, polyangular, circular, or ovaloid depending on the implementation. The cooler body **110** is preferably made of a durable plastic, such as High-Density Polyethylene, Poly-Propylene, Acrylonitrile Butadiene Styrene (ABS) plastic or other plastic material, and includes an outer shell and inner shell. The inner shell is formed from food-grad plastic. Insulation material such as polyurethane or polystyrene foam fills a void formed between the inner and outer shells, as described in more detail below. In some embodiments the outer shell may be formed of a pliable material, such as nylon fabric. In yet other exemplary embodiments, the exterior shell can include a combination of hard material, such as plastic, and a pliable material, such as nylon fabric. Although described herein as being preferably made of plastic, some embodiments may use metal or other materials for the cooler body **110**.

In some embodiments the outer shell of the cooler body **110** may be blow molded, but may also be injection molded, thermoformed, roto-molded, or formed using other commercially known methods. In some embodiments the cooler **100** is generally rectangular, with a width that is between 10 and 40 inches wide, a depth between 10 and 20 inches, and a height between 5 and 30. Other embodiments may include different dimensions. In one embodiment the outer shell of the cooler body **110** is 0.008 inches thick. The outer shell of the cooler body **110** may be colored, and may include UV inhibitors integrated within the plastic or applied to the surface to maintain the color.

FIGS. **2**A and **2**B illustrate the cooler **100** of FIGS. **1**A and **1**B having a blender **170** mounted thereon. As described in more detail below, in some embodiments the blender **170** is matingly received by a blender recess **142** (FIG. **1**B) formed within the second lid **140**. Although preferably a base of the jar of the blender **170** and the blender recess **142** are formed to engage or mate with one another to hold the blender **170** in a fixed relationship, other methods of securing the blender to the cooler **100** are possible. In some embodiments the recess **142** is a negative impression of the geometry of the bottom of the jar of the blender **170** so that when the blender jar is inserted into the blender recess, the shapes interfere with one another to prevent rotation of the blender jar. Integration of the blender **170** with the cooler **100** is described below.

FIGS. **3**A, **3**B, and **3**C illustrate operation of the first and second lids **130**, **140** of the cooler **100**. Either or both of the lids **130**, **140** may attach to the cooler **100** through a hinge. For example, the first lid **130** may be attached to the cooler **100** by a hinge **134**, and the second lid **140** may be attached

to the cooler **100** by a hinge **144**. Either or both of the hinges **134** may be formed of metal or plastic, for example. Preferably the hinges **134**, **144** are durable and piano-style hinges formed of stainless steel. The hinges **134**, **144** are preferably screwed to the cooler body **110**, but may be mounted using other means, such as glues or other adhesives, either solely or in combination with other mounting methods, such as screws, rivets, etc. The hinges may be partially or fully covered in plastic or other material to prevent interference with sharp edges of the hinge. In one embodiment plastic bumpers are mounted to the lid or cooler body to cover the ends or edges of the hinges. The hinges **134**, **144** allow rotational or pivoting movement of their respective lids **130**, **140** to allow access to the interior portion of the cooler body. In other embodiments, the lid or lids are not permanently affixed to the cooler body **110**, but instead, can be slidably removed and applied onto or into the cooler body. In this embodiment, the lid typically has an interference or snap-in fit with the cooler body.

In other embodiments the lid or lids **130**, **140** may not be physically attached to the cooler body **110** at all, and may instead include recesses either in the lid or the cooler body to structurally receive the lid and maintain it in a relatively fixed relationship to the cooler body, but can be separated when desired. In yet other embodiments the lids are removably attached to the cooler body, and include a catch or latch attached to either the lid or to the cooler body. Operation of the catch or latch allows the lid to separate from the cooler body or be selectively secured to the body.

The lids **130**, **140** can be made of a hard material, a soft material, such as nylon fabric, or a combination thereof and can have a number of shapes. For example the lids may be formed of injection molded plastic, such as ABS plastic. The lid or lids **130**, **140** may include a rubber or foam gasket for further insulating the contents of the cooler **100**, or may be formed from a combination of materials. In the preferred embodiment, the first lid **130** functions to open and close access to the contents of the cooler body **110**, to provide an insulated barrier to maintain a desired temperature within the cooler body, and to retain or enclose one or more plates **136** and one or more knives **134**, as described in more detail below. Further, in the preferred embodiment, the second lid **140** functions to open and close access to the contents of the cooler body **110**, to provide an insulated barrier to maintain a desired temperature within the cooler body, and to retain or enclose the blender elements, such as a motor, a transmission such as a gearbox or pulleys, a drive spindle, a battery and an operation switch. Other components may be stored or disposed within the second lid **140** as well.

FIGS. **3**A, **3**B, and **3**C each show the lids **130**, **140** as fully opened. When fully opened, the lids **130**, **140** extend from the cooler body **110** and form a horizontal surface. As illustrated in FIG. **3**B, the blender **170** may be stored within another blender recess **143** on the inside surface of the second lid **140** that is structured to accept the base of the jar of the blender **170**. In other words, the blender recesses **142** and **143** may have the same shape on opposing sides of the second lid **140**, so that the blender may be stored in a working position when the second lid **140** is closed, and stored in a storage position when the lid is opened. In other embodiments the blender **170** may be temporarily stored on the inside of the second lid **140** in a blender recess **143** that has a different shape than the blender recess **142**. For example, the blender recess **143** may merely be circular in shape, and not formed to prevent the jar of the blender **170** to rotate as would the blender recess **142**. In other embodiments, the blender recess **143** may not be a recess at all, and may instead be a protuberance or projection sized and shaped to engage the bottom of the jar of the blender to hold the blender in place when the second lid **140** is open.

FIGS. **4**A and **4**B are front and front perspective views, respectively, showing additional detail of how the first lid **130** may be mounted to the cooler **100** of FIG. **1**A, as well as its operation, according to embodiments of the invention.

A lid **230** may be an example of the first lid **130** illustrated in FIGS. **3**A, **3**B, and **3**C. In this embodiment the lid **230** is secured to a body **210** of the cooler by a piano hinge **234** held in place by an attachment mechanism, such as one or more screws **235**. An integrated handle **220** is also attached to the body **210** of the cooler by an attachment mechanism, such as one or more screws **230**. This particular structure of the integrated handle **220** allows the body **210** to be blow molded, or otherwise produced by a mold while including an undercut, integrated handle **220** for the cooler. FIG. **4**B shows the lid **230** in its fully opened position. Recall from above that the lid **230**, when fully opened, forms a horizontal surface **260** with respect to the body of the cooler. In some embodiments, a mating side surface **212** of the body **210** of the cooler is angled to match a mating side surface **232** of the lid **230**. For example, the mating side surface **232** of the lid **230** may have an angle **284** approximately 110° to a top surface **280** of the cooler, while the mating side surface **212** of the body **210** has an angle of approximately 70° to the top surface **280**. The actual angles chosen for implementation may vary depending on implementation details, however preferred embodiments include angles of the lid and cooler body that are supplementary angles, i.e., the angles of the adjoining sides add to 180°, so that the surface **260** of the lid **230** creates a generally horizontal surface when the lid **230** is fully opened. The same may be true of the second lid **140**.

The structure of the embodiment illustrated in FIGS. **4**A and **4**B also allow the hinge **234** to be mounted within the outside surface **210** of the cooler. In other words, if the lid **230** and outside surface **210** of the cooler had straight (i.e., 90°) sides, then, to fully open the lid **230** would require the hinge **234** to be mounted at the absolute outside edge of the cooler, which could expose the hinge **234** to being damaged through use. Because the hinge **234** is recessed from the outside edge of the cooler in embodiments of the invention, such damage is prevented in those embodiments. For those embodiments that have 90° sides, the exposed hinge may include extra protection, such as a plastic covering or a hardened surface covering the exposed hinge.

A support structure including one or more lateral supports **240** and one or more vertical supports **241** is included within the body of the cooler, as illustrated in FIGS. **4**A and **4**B. The support structure may be formed of high density plastic or other material structured to provide mechanical support. Such supports prevent the weight of the lid **230**, or the weight of items stacked on the lid **230** or forces otherwise applied to the lid **230** from denting or crushing the sides of the cooler. In other words, the lateral and vertical supports **240**, **241** prevent deformation of the outside surface **210** of the cooler. This is especially important when the lid **230** is relatively long, which provides mechanical advantage to the crushing force. During production of the cooler, the lateral and vertical supports **240**, **241** may additionally be surrounded by or integrated with foam insulation, which gives additional mechanical structure to the lateral and vertical supports **240**, **241**, to withstand the force of the lid as it is meets the side of the cooler while being open. The lateral and vertical supports **240**, **241**, with or without the addition of further foam insulation, also provide a surface to which the securing screws **230**, **235** may be mounted.

A top surface of the first lid **130** may include recesses for holding drinks, as illustrated in FIG. **1**B. Additionally, as illustrated in FIG. **5**, an inside surface **261** of the first lid **130**, **230**, may accommodate one or more accessories, such as one or more plates **286** and one or more knives **296**. The surface **261** may be shaped to accommodate the plates **286**, such as in an indentation **290**. The indentation **290** is uniquely shaped having a partially circular end and an opposite open end. The indentation **290** may be for example, between approximately 0.25 and 1.25 inches deep, and preferably approximately 0.75 inches deep, and may include an inclined surface that is angled or beveled with respect to the top surface **261**. The depth of the indentation **290** created by the inclined surface is sized and shaped to accommodate the plates **286**. Although four plates **286** are illustrated in FIG. **5**, the depth of the indentation **290** may be more deep or more shallow to accommodate any number of plates **286**. A groove **291** may be placed within the indentation **290** and sized to mechanically hold edges of the plates **286** in place. In other embodiments the groove may further incorporate a friction edge to increase the friction against the plates **286** to hold them in place. For example the friction edge may be made of rubber or silicone. In other embodiments the friction edge or a portion of the groove **291** is removable to provide access to the plates **286**, and a user would remove the friction edge or top portion of the groove to remove the plates vertically, one at a time or in a group, and then re-install the friction edge or top portion of the groove after the plates have been returned to the indentation **290**.

Further, the plates **286** may be shaped to nest in a group, such as by including a series of projections on an individual plate that mechanically sit within one or more mating recesses of another plate. In such a way the plates **286** may be removed or inserted as a group, but also could be removed or inserted individually. Additionally, the indentation **290** may include a retaining member **292** to help retain the plates **286** within the indentation. For example the retaining member **292** could be a molded projection within the indentation **290**. To remove one or any number of the plates **286**, the user would grab the desired number from the stack of plates **286** and pull them past the retaining member **292**, which would deform slightly to allow the plates to become free. In other embodiments the retaining member **292** is a movable assembly having an attached edge and a free edge. The free edge could be urged toward the center of the indentation **290** by a spring (not illustrated). Then, moving the stack of plates **286** could be extracted by pulling the plates toward the open end of the indentation **290** and overcoming the spring force of the retaining member **292** to remove the plates. The same action is made when returning the plates **286** to the indentation **290**.

The first lid **130**, **230** may additionally include a recessed knife store **298**. The store may include a safety latch **295** that must be slid or otherwise operated to gain access to the knife **296**. A pivoting sheath **297** could store the sharp edge of the knife **296** to cover the exposed blade and prevent accidental injuries. Further, the sheath **297** could include a retaining mechanism, such as a two-sided pinch-lock (not illustrated) to retain the knife **296** in place. In such an embodiment the knife **296** is extracted by first sliding the safety latch **295** to gain access to the handle of the knife **296**. Then, the user removes the knife **296** by pressing the pinch lock while simultaneously pulling the knife away from the sheath **297**. In other embodiments the retaining mechanism of the sheath **297** could merely be a projection or indentation that matingly snaps the knife **296** into place, to be stored, but allows the knife to be withdrawn and re-inserted with a sufficient amount of force.

Referring back to, for example, FIG. **3**C, recall that the first lid **130** included storage for plates and knives, while the second lid **140** houses the blender and other accessories, as is now described in detail.

FIG. **6**A is a perspective view of a top surface of the second lid, while FIG. **6**B is a perspective view of a bottom surface of the second lid. FIG. **6**C is an end view of the second lid illustrating an integrated charging port and a battery status indicator. A lid **300** illustrated in FIGS. **6**A, **6**B and **6**C may be an example embodiment of the second lid **140** illustrated in FIGS. **3**A, **3**B, and **3**C. The lid **300** of the embodiment illustrated in these figures includes a top surface **310**, into which a blender receiver or recess **320** is formed. As described above, the blender recess **320** is sized to matingly receive the jar of the integrated blender and hold it in place during operation. The blender is operated by a rotating spindle **322**. One or more switches **330** control operation of the blender. In some embodiments, as shown below, the blender is battery powered by a battery stored within the lid **300**. The battery may be accessed through an access door **350**, illustrated in FIG. **6**B, which illustrates the underside of the lid **300**. The access door **350** is preferably gasket sealed or otherwise water-tight.

A light, such as an LED light **360** is integrated into the lid **300** and controlled by a switch **370**. In some embodiments the switch **370** controls a timed circuit, so that when the switch **370** is pressed, the light **360** will remain illuminated for a set period of time before turning off, such as 5 to 60 seconds, and preferably 30 seconds. In other embodiments the switch **370** may be a momentary switch, so that the light **360** remains illuminated so long as the switch **370** remains actuated, such as by pressing the momentary switch. As illustrated in FIG. **3**C, the lid **300** is attached to the cooler body by a hinge so that the lid pivots or rotates about the hinge. Since the light **360** is integrated to the lid **300**, rotating the lid **300** also controls the direction of where the light **360** is pointing. In some embodiments, it may be necessary to rotate the lid while controlling the operation of the light **360** so that the light illuminates the interior of the cooler. In some embodiments only a single LED bulb is necessary to be included in the light **360** for adequate illumination, especially when the inner shell of the cooler is lightly colored, such as white, grey, or beige, for example. In other embodiments the light **360** may include any number of separate light sources. It is preferable that the light **360** and switch **370** are water resistant or waterproof.

FIG. **6**B also illustrates an inner blender recess **343** formed within the underside **340** of the lid **300**. As described above, the inner blender recess **343** is sized and shaped to retain the jar of the blender. Note the lack of a spindle in the blender recess **343** compared to the presence of the spindle **322** in the blender recess **320** illustrated in FIG. **6**A. Therefore, in the illustrated embodiment, the blender is operational only when the second lid **300** is place in a closed position, i.e., it is covering at least a portion of the storage section of the cooler. In other embodiments, however, the spindle **322** may be present within the blender recess **343** of the underside **340** of the second lid **300**, and may not be present in the blender recess **320** of the top surface **310** of the lid **300**. In such an embodiment the blender is operational only when the second lid **300** is placed in an opened position. In yet other embodiments a spindle may be present in both of the blender recesses **320** and **343** on both the upper and inside surfaces of the second lid **300**. This embodiment

allows the user to operate the blender regardless of the position of the second lid **300**.

FIG. **6**C is an end view of the second lid **300**. An indicator **380** displays the charged state of the internal battery. The charging state may be indicated by a number of indicator lights illuminated, for example more lights illuminated indicate a greater charge. In other embodiments one or more indicator lights may change colors, for example, from green to red when the battery is discharging or discharged. Many variants are possible. A charging port **390** provides battery power for charging rechargeable devices from the internal battery. In some embodiments the charging port **390** may be a Universal Serial Bus (USB) charging port, or other popular charging port for electrical devices. In some embodiments the charging port **390** may be a universal port that provides charging access from the internal battery to any of a number of types of charge ports. For example, the charging port **390** may facilitate use of a number of particularized port attachments that may individually electrically and/or electrically and mechanically connect to the charging port **390**. For instance, one particularized port attachment may be a USB port attachment that attaches to and makes electrical contact with the charging port **390**. Another particularized port attachment may be an LIGHTNING port. To charge a USB device, the user inserts the USB port attachment into the charging port **390**, then connects the device to be charged to the USB port attachment. To instead charge a LIGHTNING device, the user removes the USB port attachment from the charging port **390** and instead inserts the LIGHTNING port attachment into the charging port **390**. Then the user connects the LIGHTNING device to the LIGHTNING port attachment. Different port attachments, in addition to being physically different, may also be electrically different. For example, various port attachments may include voltage matching, such as a voltage limiter, to reduce the voltage of the internal battery to the recommended charging voltage. Although the device to be charged may be plugged directly into the charging port **390** or to an accessory port coupled to the charging port, electrically access may also be communicated through a cord that has the appropriate ports on both ends. In such an example, the cooler **100** may include a single charging port **390**, and further include a number of different electrical cords that are compatible with the charging port **390** that connect to particular charging ports on various devices. Such devices may include a music player, speaker, phone, camera, GPS, gaming device, rechargeable flashlight, etc. Once the device to be charge is electrically connected to the internal battery, then charge from the internal battery is transferred from the internal battery to the device to be charged.

In some embodiments the charging port **390** is not limited to being a charging port, but could also include a power socket to provide direct access to the battery within the cooler. In such an embodiment the power socket could be used to provide access to the battery within the cooler to run, for example, a plug-in electric air pump for inflating beach balls or water flotation devices. The charging port **390** could be fitted with or coupled to a cigarette-lighter style plug for wide compatibility.

Both the indicator **380** and charging port **390** are water resistant or even waterproof. In some embodiments the charging port **390** includes a waterproof cap, which may be secured to the charging port. The waterproof cap keeps the charging port **390** waterproof so long as the cap is in place.

FIGS. **7**A, **7**B, and **7**C are cross-sectional views of the second lid **300** illustrating various internal components and controls.

The internal components of the second lid **300** of this embodiment includes a battery **352**, a motor **334**, a motor control switch **330**, and various options to transfer power from the motor to the spindle **322**, such as through a transmission. The spindle **322** is mounted to the underside of the blender recess **320** with a bushing, such as a pre-impregnated bronze bushing. In other embodiments the spindle **322** may include one or more bearing surfaces to reduce the rotational drag, such as roller bearings. In general, in operation, the user places a jar of a blender (not illustrated in FIG. **7**A, **7**B, or **7**C) within the blender recess **320** where the blender then engages the spindle **322**. The user operates the control switch **330**, which may be a two-part switch. A two-part switch reduces the chances that the blender is unintentionally operated. In a two-part switch, both parts of the switch are operated simultaneously. In the illustrated two-part switch, a first portion is rotatably raised with a first hand while the second portion is simultaneously pressed with the second hand. This action completes the electrical circuit between the battery **352** and the motor **334** and causes the motor to spin. In the embodiment illustrated in FIG. **7**A, the spindle **322** is directly attached to a rotating portion of the motor **334**. In other words, when the rotator of the motor **334** spins, the spindle **322** is necessarily spinning because the spindle is part of the motor. Such spinning engages blades within the blender to cause the blender to operate, such as crushing ice or blending multiple components of drinks together.

Some embodiments include a lock-out, such as a reed switch or hall-effect sensor within the blender recess **320** to prevent the motor **344** from energizing unless the base of the blender is properly positioned within the blender recess. In these embodiments the lock-out prevents operation of the motor **334**, regardless of the operation of the switch **330** if the blender jar is not seated within the blender recess. In operation, a reed switch or hall-effect sensor changes states based on the presence of a magnet mounted to or within the jar of the blender. In the case of the reed switch, a metal reed is attracted to the magnet and physically makes electrical contact with another part of the switch to close the lock-out circuit, which allows electrical current to flow. In the case of the hall-effect sensor, the sensor is structured to detect the presence of the magnetic field caused by the magnet, and change states, such as an output voltage, based on the presence or absence of the magnetic field. Detection of the changed state allows the lock-out switch to determine whether the blender is properly positioned in the blender recess **320**.

Other embodiments the lock-out may prevent operation of the motor **344** unless the blender jar is rotated after being positioned within the blender recess **320**. In yet other embodiments the lock-out may prevent operation of the motor **344** unless the blender jar is physically being pressed into the blender recess **320** while the switch **330** is simultaneously depressed. In such an embodiment the switch **330** need not be a two-part switch, because manipulation of the blender jar has the effect of providing one of the two-parts of the safety switch **330**.

The motor **334** is preferably a DC motor operating between 12 and 24 volts and is preferably an 18-19.2 volt motor. In one embodiment the motor **334** is an 18 volt DC motor having a no-load speed of greater than 5000 RPM, with a no-load current draw of less than 15 Amps. Of course the motor specifications may be based on final implementation and may widely vary.

In some embodiments the motor **334** may be a brushless direct-drive motor and include a motor controller (not illus-

trated) coupled to the motor **334** and operable to control the rotational speed and power draw of the motor. The motor controller may be a programmed circuit, located on, for example, a programmed chip on a printed circuit board, and electrically connected to the motor. In other embodiments the motor controller may be an Application Specific Integrated Circuit. The motor controller may be programmed or implemented to include multiple timing stages. For instance the motor controller may operate in a first stage to cause the motor **334** to operate at a first speed and power level to initially crush ice contained within the blender. Next the motor controller may operate in a second stage to increase the blade speed from the first stage to a moderate stage for an initial blending stage. Finally the motor controller may operate in a third stage to further increase the blade speed for a final blending stage so that the contents of the blender are blended to a desired level. The motor controller may be pre-programmed or the stages may be directly controlled by the user. In such an user-controlled embodiment, the user would press the switch **330** once for stage one, twice in succession for stage two, and three times in succession for stage three, or some other combination. In another embodiment the user could keep the switch **330** depressed and the motor controller could automatically step through all three stages. In some embodiments the motor controller could use Pulse Width Modulation to limit the current drawn from the battery **352** to the motor **334** during operation. For example the motor controller could use pulses having a particular operational pulse width and power cycle for each stage of motor operation. In other embodiments the motor controller could drive the motor **334** through more than 3 stages.

In an exemplary embodiment a first, startup stage operates for less than 1 second. The startup stage rotates the motor from 0 to an approximate first RPM. In the same exemplary embodiment, an ice-crushing, second stage spins the motor between approximately the first RPM and approximately a second RPM that is faster than the first RPM. The second stage may last for between 1 and 20 seconds, for example. In the same embodiment, a blending, third stage operates between approximately the second RPM and a third RPM that is faster than the second RPM. The third stage may last for between 5 and 20 seconds, for example.

FIGS. **7**B and **7**C illustrate other structures and methods to transfer the rotational energy of the spinning motor **334** to the rotating spindle **322**, such as through various transmissions. For example FIG. **7**B illustrates a pulley and belt system where the motor **334** includes a first pulley that is mechanically connected to a second pulley **337** through a belt **338**. The belt may be a toothed belt, a solid belt, or another type of belt. In some embodiments a chain may connect the pulleys **337**, **339**. The second pulley **337** is directly coupled to the spindle **322**. In operation, when the motor **334** spins, this causes the first pulley to spin, which in turn causes the belt **338** to cause the second pulley **337** to spin and turn the spindle **322**. This, in turn, drives the blender. By adjusting the relative sizes of the pulleys **337**, **339**, the power ratio and speed ratio of the motor **334** to spindle **322** may likewise be adjusted. In other words, a smaller second pulley **337** drives the spindle **322** at a lower speed but has more power, while a larger second pulley **337** sacrifices power for additional rotational speed of the spindle **322**.

The embodiment illustrated in FIG. **7**C includes a gearbox **336** that likewise may be used to adjust a power and speed ratio of the motor **334** to the spindle **322**. The power and speed of the gearbox **336** may be adjusted by specifying the relatively number of gears connected to the input and output shafts. The gearbox **336** of this embodiment also changes the rotational direction of the internal spinning shafts. In other words, the gearbox **336** accepts a motor shaft having a horizontal orientation and has an output shaft in the vertical orientation. The gearing of either the embodiments illustrated in FIG. **7**B or **7**C may be selected to provide suitable torque and RPMs to sufficiently blend drinks, crush ice and puree smoothies to their desired consistencies.

The motor **334** may be retained within the second lid **330** in a number of ways. For instance, the motor **334** may be mechanically attached by screws or adhesives. The motor **334** may instead be clamped using a clamping unit (not illustrated), so that the motor unit may be removed for repair or replacement.

The battery **352** provides power to the motor unit **334**. In the preferred embodiment the battery **352** is rechargeable. In some embodiments the battery is removed from the second lid **300** by opening the cover **350** and recharged in a separate recharging device. Then the battery **352** is replaced in the lid **300** when the battery is fully charged. In these embodiments the second lid includes no charging capability. In other embodiments, the second lid **300** may be connectable to a conventional electrical outlet, car battery, solar panel, or other charging source to charge the battery while the battery is within the lid **300**. In such an embodiment the lid **300** may include an internal charging port (not illustrated), which, similar to the external charging port **390** illustrated above in FIG. **6**C, may include a waterproof cover for protection. Such an embodiment may not be desirable due to the extra heat generated by charging the battery and the extra complexity of including a battery charging circuit within the lid **300**.

In some embodiments the battery **352** is a rechargeable 10-cell lithium-Ion battery pack including two-parallel sets of five lithium-Ion cells in series. Since each Lithium-Ion cell outputs approximately 3.6 volts, the five cells in series outputs approximately 18 volts, which matches the operating voltage of the motor. Including ten cells in the battery pack, i.e., two parallel sets of five cells, gives a total capacity of approximately 1500-4000 mAh. Of course other combinations of cells in the battery **352**, such as more or fewer cells, or having the cells connected in a different configurations, is possible to match a desired output voltage and storage capacity for the battery **352**. In other embodiments the battery **352** may be made of different materials other than lithium-Ion, such as lead-acid, nickel cadmium, nickel metal hydride, or lithium ion polymer, for example.

FIGS. **8**A and **8**B are a top view and perspective view illustrating an interior space or storage space **400** of the cooler **100** illustrated in FIGS. **1**A and **1**B according to embodiments of the invention. FIG. **8**C is a perspective view of the interior space illustrated in FIGS. **8**A and **8**B further including illustration of an integrated cutting board according to embodiments of the invention. FIG. **8**D is a perspective view of the interior space illustrated in FIGS. **8**A and **8**B showing additional detail according to embodiments of the invention.

As described above, the storage space **400** is used to keep items cool in the cooler **100**. In some embodiments, retaining grooves or slots **410** are formed into the interior shell of the cooler **100**. As illustrated in FIG. **8**C., these slots **410** are structured to accept a divider **440** to divide the storage space **400** of the cooler **100** into separate spaces. For example one section of the storage space **400** could be used to hold clean ice for the blender, while another section of the storage space could hold drinks surrounded by additional ice. By including two slots **410** in the cooler **100**, the storage space **400** could

be divided yet again to provide three separate spaces within the storage space. The third storage space could be used to store dry items, i.e., items that are intended to be kept cool but that the user may not want to directly contact ice.

Although illustrated in these figures as having two separate slots **410**, embodiments could include as many or as few slots **410** as desired.

One or more removable dividers **440** could be inserted into the respective slots. In some embodiments the dividers **440** may serve additional functions. For example the divider **440** may be used as a cutting board for slicing fruit.

The slots **410**, as illustrated in FIG. **8**A, include a front and a rear vertical section formed in the sides of the cooler **100**, as well as a generally horizontal section formed in the bottom surface of the cooler. Having slots on three sides provides stability to the removable divider **440** to retain it in place.

The generally horizontal slots **410** are coupled to slot extensions **412**, which further extend to an internal drain cup **420**. The horizontal slots **410**, in addition to providing mechanical stability to retain the removable dividers **440**, also provide a channel to guide melting ice, i.e., water, or other fluids in the bottom of the interior space **400** to the slot extensions **412**, which further allows the fluids to gather in the internal drain cup **420**. In some embodiments the horizontal slots **410** and slot extensions **412** are approximately 0.25 inches deep, and 0.25 inches wide, and sloped toward the drain cup to facilitate flow toward the drain cup **420**. In some embodiments the drain cup **420** is approximately 2-4 inches in diameter, and approximately 1-3 inches deep. Preferably the drain cup **420** is approximately 3 inches in diameter and 2 inches deep. The drain cup **420** may be circular or polyangular as illustrated. Additional detail is illustrated in FIG. **8**D.

A drain hole **430** extends from the drain cup **420** through the outer surface of the cooler **100**. The drain hole **430** is relatively large, such as 0.75-1.5 inches in diameter to facilitate rapid discharge of water collected in the drain cup **420**. The drain hole **430** may have a removable or retained cap or other mechanism to allow selective opening. In other words, the user may close the cap or otherwise close the opening to the drain hole **430** and allow water to accumulate in the drain cup **420**, or may open the cap or otherwise open access to the drain hole to allow the water or other fluids to drain from the drain cup. The drain hole **430** may further include a screen, mesh or some other retaining structure to simultaneously allow liquid to flow through while retaining any solids, such as small ice cubes, to be retained within the storage space **400** of the cooler **100**.

FIGS. **9**A, **9**B, and **9**C are perspective views of an accessory storage unit **500** built in or attached to the cooler illustrated in FIGS. **1**A and **1**B. In some embodiments the storage unit **500** may be attached to the front surface of the cooler **100**, as illustrated in FIGS. **1**A and **1**B, although the storage unit **500** may be attached or coupled to the sides or back of the cooler **100**. In another embodiment the storage unit **500** may be attached to one or integrated into one or more of the lids **130**, **140**.

With reference to FIGS. **9**A, **9**B, and **9**C, the storage unit **500** includes a bottle opener section **510** as well as a covered portion **520**. The covered portion **520** is covered by a movable lid **522**, illustrated in FIG. **9**B. The bottle opener section **510** includes a bottle opener **512** as well as a cap collection area **514**. The bottle opener may be formed of bent or formed metal and sized and shaped to facilitate opening standard crown-capped bottles. After opening, the crown cap is retained within the cap collection area **514**. The cap collection area may include a magnet within or impregnated within plastic to retain the crown caps after removal. A slot **516** allows any liquids collected in the cap collection area **514** to drain. In other embodiments, the function of the slot **516** may be performed by an integrated discharge tube that routes collected liquid from the storage unit **500**. In some embodiments the discharge tube may discharge directly into the storage space **400** of the cooler **100**. In other embodiments the discharge tube may discharge directly into the drain cup **420** illustrated in FIGS. **8**A, **8**B, **8**C, and **8**D. In yet other embodiments the discharge tube may discharge liquids to the ground.

The covered portion **520** of the storage unit **500** may be used to retain any item desired to be retained with the cooler **100**, such as keys, phones, sunglasses, wallets, etc. In a preferred embodiment the covered portion stores a music player as well as a music source, such as an MP3 player or a smartphone. In yet another preferred embodiment the covered portion **520** is sized to exactly retain an integrated, removable music player that is described in more detail below. The covered portion **520** of the storage unit **500** may be approximately 5-15 inches wide and 5-15 inches tall. Preferably the covered portion is approximately 10 inches wide and approximately 8 inches tall.

An integrated music player is sized and shaped to be removably stored within the covered portion **520**. Preferably the music player is a self-contained, self-powered, music player that includes an audio input, an amplifier, and one or more speakers. The audio input may be a wired or a wireless input, or the music player may include both types of audio inputs. In a preferred embodiment the music player may be an audio player, such as an MP3 player, that may wirelessly connect to the audio source using the Bluetooth or DLNA audio standards. The audio source may be a phone, MP3 player or other audio source, for example. The music player is preferably self-powered and includes a rechargeable battery that is charged using a separate charging device. In some embodiments the music player may be powered from the battery **352** illustrated in FIGS. **7**A, **7**B, and **7**C. The music player may be retained within the covered portion **520** using clips, latches, and/or straps. In other embodiments the music player is covered in pliable foam and is sized to press-fit within the covered portion **520** for easy insertion and removal. In other embodiments, the music player may not be stored within the covered portion **520**, but may instead be stored within either the first lid **130** or second lid **140**, depending on implementation.

The covered portion **520** is accessible by operation of a cover lid **522**. The cover lid **522** may be hinged, as illustrated, or may be held into place using other methods, such as magnets, snaps, or latches.

FIG. **9**C. is a rear perspective view of the storage unit **500**. A rear support **550** is illustrated. The rear support **550** is used during manufacturing of the cooler **100** to provide attachment points for the storage unit **500**. The storage unit **500** may be attached through the outside body of the cooler **100** and into the rear support by a retaining mechanism such as screws. In some embodiments the storage unit may additionally be held in place with adhesives or using other methods. As illustrated in FIG. **9**C, the storage unit has depth, approximately 1-3 inches, to provide storage area within the covered portion **520**. As described below, this depth also creates an attachment point for a gear tie-down.

FIGS. **10**A, **10**B, and **10**C are perspective views illustrating a handle **600** integrated into the cooler illustrated in FIGS. **1**A and **1**B according to embodiments of the inven-

tion. In the illustrated embodiment, the handle **600** includes a lower attachment area **610**, an upper attachment area **620**, and a top grip area **630**.

The lower attachment area **610** is illustrated in detail in FIG. **10**B. The lower attachment area includes apertures **624** for receiving one or more poles **626**. The lower attachment area **610** is held to the body of the cooler **100** by screws or adhesives, or by both screws and adhesives as has been described above with reference to other attachment methods. The lower attachment area **610** includes a platform **612** sized and shaped to accept a foot placed thereon. In operation, a user can step on the platform **612** to provide leverage while pulling back on the handle **600** to tip the cooler so that it is resting on the wheels and ready for travel. The platform **612** may be integrated or affixed to the lower attachment area. The platform **612** may additionally include treads **614** to increase friction and to hold the foot in place during the tipping operation. The lower attachment area further includes slots **616** and an overhang **618** described with reference to the gear storage system illustrated and described below.

Referring back to FIGS. **10**A and **10**C, the upper attachment area **620** may be directly attached to a top lip of the cooler, as illustrated in FIG. **10**C. Such an attachment method provides a strong attachment system to withstand the forces caused that using the handle **600** may invoke. A top grip area **630** includes a release button **630** to allow the handle **600** to be extended or retracted in a telescoping manner. In other words, the poles making up the handle **600** may slide within one another to reduce area when the handle is not needed.

FIGS. **11**A and **11**B are perspective diagrams illustrating an external shape of a rear portion of the cooler illustrated in FIGS. **1**A and **1**B, and FIG. **11**C is a side view diagram illustrating the same.

As described above, the cooler **100** is preferable rectangular in shape. Conventional coolers have a problem, however, in that they tend to drag across soft surfaces, such as sand, tall grass, or the forest floor. Even conventional coolers including wheels have this dragging action because of the outer shape of the conventional cooler, which tends to dig into the soft surface. Embodiments of the invention address this problem by including a sliding portion **170** of a rear surface of the cooler **100** to accommodate such operational conditions. More specifically, the sliding portion **170** is shaped, formed, or otherwise implemented to cause the cooler **100** to follow the contour of a soft surface over which the cooler **100** is traveling. For example, if the cooler **100** as illustrated in FIG. **11**A is being pulled through sand, even the relatively large wheels of the cooler **100** may tend to sink in the sand. Conventional coolers plow the sand with a rigid and sharply shaped rear-bottom edge. The cooler **100** according to embodiments of the invention, however, include a sliding portion **170** integrated into the form factor of the rear and bottom surfaces of the cooler **100**. With reference to FIGS. **11**B and **11**C, the illustrated embodiment includes no sharp edges that tend to plow into soft surfaces. Instead, the sliding portion **170** of the cooler **100** is shaped to cause the cooler to more easily slide over the soft surface. Although the sliding portion **170** is illustrated here as having a curved surface having a radius that is smaller than a radius of the wheels **120**, the sliding portion **170** may take other shapes. For instance the sliding portion **170** may be a relatively flat angle. In some embodiments the curved portion of the rear of the cooler may start approximately one-third to one-half from a depth of the cooler, and continue to approximately one-third to one-half of the height of the cooler. Such a structure is illustrated particularly well by FIG. **11**C. In other embodiments an angled portion may start approximately one-third from a depth of the cooler and continue to approximately one-third of the height of the cooler. In one embodiment (not illustrated), the sliding portion **170** is relatively planer and has an angle of approximately 45° relative to the bottom surface and/or a rear surface of the cooler **100**. The sliding portion **170** is shaped to provide additional clearance to the bottom edge of the cooler **100** when the cooler **100** is tipped backwards. In some embodiments the sliding portion **170** is shaped to provide maximum clearance between a rear surface of the cooler **100** when the cooler is tipped backwards between approximately 30-60 degrees, and preferably when the cooler is tipped backwards at approximately 45 degrees.

FIG. **12**A is a rear view of the cooler **100** illustrated in FIGS. **1**A and **1**B. As described above, the cooler **100** includes one or more wheels **120**. The wheels may be formed of strong plastic or rubber, for example. As illustrated in FIGS. **11**A, **11**B, **11**C, and FIG. **12**A, the body of the cooler may be specifically shaped to provide relief for the wheels. In other words, the body of the cooler **100** is cut in to accept the wheel mounts so that the wheels **120** do not extend beyond the lateral edges of the cooler. In addition, a width of the wheels is chosen to be quite wide relative to standard wheels. Selection of wider wheels allows the wheels to better support the cooler when traveling over soft surfaces, so that the weight of the cooler does not drive the wheels into the soft surface. In one embodiment, the overall cooler width is approximately 25 inches wide, while each of the wheels **120** has a width of approximately 2.5-4 inches, and preferably approximately 3 inches. The width of the wheels **120** may scale as the width of the cooler changes so as to keep the same approximate wheel-width to cooler-width ratio. In one embodiment each wheel has a diameter of approximately 3-8 inches, and preferably 6 inches.

FIGS. **13**A and **13**B illustrate additional features of the wheels that may be attached to the cooler of FIGS. **1**A and **1**B according to embodiments of the invention. In this embodiment the wheels **120** include alternating lands **122**, **123**. A groove is formed by forming recesses **124**, **125**, respectively in the alternating lands **122**, **124**. When multiple recesses **124**, **125** are formed together, the groove is formed. As illustrated in FIG. **13**B, an O-ring **126** may be disposed within the groove, and held in place by the alternating recesses **124**, **125**. The O-ring may be formed of rubber or other pliable material that is softer than the material forming the wheels **120**. The combination of the harder material for the wheels **120** with the softer material for the O-ring functions to absorb noise caused when the cooler **100** is rolled on a hard, relatively rough surface, such as concrete or asphalt. Additionally, the O-ring **126** may be replaced without requiring replacement of the entire wheels **120**. In some embodiments the O-ring **126** has a diameter of between 0.01 and 0.5 inches. In other embodiments the O-ring may be an internal component of a much wider soft cover for wheels. In other words, such a wheel cover may have a width of 1-2 inches wide on the exterior surface, with an internal O-ring to keep the wheel cover in position on the wheel **120**.

Another feature of the cooler according to embodiments of the invention is an integrated tie-down system, illustrated best with reference to FIGS. **12**A, **12**B, and FIG. **1**B. Embodiments of the invention include an integrated tie-down system, which incorporates pieces of the handle **160** as well as the storage unit **500**. The tie down system includes a cord **168** illustrated in FIG. **12**B. The cord **168** is prefer-

ably a dynamic, i.e., stretchable, cord, but could be a static line as well. Examples of material for the cord **168** include elastic or nylon rubber.

The cooler **100** is structured to store the cord **168** when not in use, but is also structured to allow the cord **168** to be extended to secure gear placed on the cooler when convenient. Examples of gear placed on the cooler may include, for example, folding chairs, sporting equipment, blankets, etc. When a user wishes to use secure such items on the cooler **100**, the cord **168** may be extended over the items and secured to an underlip **152** of the storage unit **500**, illustrated best in FIG. **1**B. In other words, the end loop of the cord **168** is looped over the gear to be stored and underneath the underlip **152** of the storage unit **500**, which retains that portion of the cord **168**. Other embodiments may include different attachment mechanisms, such as hooks, loops, and underlips located on other surfaces, such as on one or more of the lids or elsewhere on the cooler body, for example. Then, the user can tighten the cord **168** by pulling excess cord **168** slack through one or both clam cleats **164** as illustrated in FIG. **12**B. The clam cleats **164** frictionally hold the cord **168** in place until released. Such release is accomplished by pulling the cord **168** laterally away from the clam cleats **164**. In addition or instead of clam cleats, the cord **168** may be tightened and/or retained in any of a number of ways, such as by using clips, latches, knobs, clamps, other types of mechanical interference or other methods to retain the tie-down cord **168**.

In some embodiments excess cord **168** may be threaded through slots **162**, illustrated in FIGS. **12**A and **12**B, and retained by cord lip **163** formed in the lower attachment area of the handle **160**.

When not in use, the cord **168** may be wrapped around the outside of both the lower attachment area **165** and upper attachment area **166** of the handle **160**, and may be retained by an undercut underneath the lower attachment area **165** of the handle **160**.

FIG. **14** is a side view of an example blender jar and associated parts for use with the cooler **100** described with reference to FIGS. **1**A and **1**B. An example blender jar **170** includes a main blender jar **172**, spout **173**, and handle **174**. The blender jar **172** may be made from food grade plastic or glass, or other suitable material. A lid **175** covers the main blender jar **172** and functions to keep items within the blender jar as they are being blended. In some embodiments the lid **175** may be sized and shaped to cover the blender recess **142** illustrated in FIG. **1**B. In such an embodiment the blender lid **175** may protect the blender spindle.

A collar **176** attaches to the blender jar **172** in a typical manner, such as by engaging corresponding threads on the outside of the blender jar and inside of the collar **176**. Also, the collar **176** may be used to secure a set of blades **177** within the blender jar **172** in a known manner. The collar **176** may be shaped to insert within the blender recess **142** of FIG. **1**B, which engages with protuberances of the collar to prevent rotation of the blender jar **172** during blending operation. Of course, the blender recess **142** may instead be shaped to form a negative geometry of the collar **176**.

A receiver **178** in the bottom of the set of blades **177** is structured to receive a blender spindle, such as the blender spindle **322** illustrated in FIG. **6**A.

In operation, the blender **170** is first assembled by inserting the set of blades **177** from an open bottom of the blender jar **172**. The set of blades **177** are held in place by securing the collar **176**, such as by threading the collar onto the blender jar **172**.

Then, to blend a drink, the contents to be blended are placed in the assembled blender jar **172**, either before or after the blender jar **172** is mounted within the blender recess **142**. To mount the blender jar **172** in the blender recess **142**, first the receiver **178** in the bottom of the set of blades is engaged with the blender spindle, such as by rotating either the spindle or the blender jar **172** to cause the blender spindle to be inserted within the receiver. Next the blender jar **172** is positioned so that it drops into the blender recess **142**. In some embodiments, positioning the blender jar **172** within the blender recess **142** satisfies the lock-out switch, thus enabling the blender **170** for use.

Next, the blender switch is actuated, which causes the motor to spin the spindle, which in turn causes the blades **177** to spin and blend the contents of the blender jar **172** into a blended drink.

What has been described and illustrated herein are embodiments of the invention along with some of their variations. The terms, descriptions and figures used herein are set forth by way of illustration only and are not meant as limitations. Those skilled in the art will recognize that many variations are possible within the spirit and scope of the invention in which all terms are meant in their broadest, reasonable scope unless otherwise indicated.

Although specific embodiments of the invention have been illustrated and described for purposes if illustration, it will be understood that various modifications may be made without departing from the spirit and scope of the invention. Accordingly, the invention should not be limited except as by the appended claims.

What is claimed is:

1. A portable cooler, comprising:

a body defining a main interior storage space, the body having an insulation compartment defined by an outer shell and an inner shell;

a lid structured to at least partially cover the main interior storage space;

an electric motor integrated in the lid; and

an attachment mechanism configured to hold a blender jar in a stationary relationship with the electric motor.

2. The portable cooler of claim **1**, further comprising a blender spindle integrated in the lid.

3. The portable cooler of claim **2** in which the blender spindle rotates at a maximum RPM that is faster than approximately 5000 RPM.

4. The portable cooler of claim **1**, further comprising a transmission coupled between the electric motor and the blender spindle.

5. The portable cooler of claim **1**, in which the blender spindle is directly driven by the electric motor.

6. The portable cooler of claim **1**, in which the insulation compartment comprises an insulation material.

7. A portable cooler, comprising:

an outer body;

an inner body;

an insulation interior defined by the outer body and the inner body;

a main interior storage space defined by the inner body;

a lid structured to at least partially cover the main interior storage space, the lid having an interior compartment;

an electric motor disposed substantially in the interior compartment; and

an attachment mechanism configured to hold a blender jar in a stationary relationship with the electric motor.

8. The portable cooler of claim **7**, further comprising a blender spindle extending from the lid.

9. The portable cooler of claim 8 in which the blender spindle rotates at a maximum RPM that is faster than approximately 5000 RPM.

10. The portable cooler of claim 7, further comprising a transmission coupled between the electric motor and the blender spindle.

11. The portable cooler of claim 7, in which the blender spindle is directly driven by the electric motor.

12. The portable cooler of claim 7, in which the insulation compartment comprises an insulation material.

13. A portable cooler, comprising:

a body defining a main interior storage space, the body having an insulation compartment defined by an outer shell and an inner shell;

a lid having a first orientation structured to at least partially cover the main interior storage space, and a second orientation structured to substantially expose the main interior storage space;

an electric motor integrated in the lid, the electric motor positioned interior to the main storage space when the lid is in the first orientation and exterior to the main storage space when the lid is in the second orientation; and

an attachment mechanism configured to hold a blender jar in a stationary relationship with the electric motor.

14. The portable cooler of claim 13, further comprising a blender spindle integrated in the lid.

15. The portable cooler of claim 14 in which the blender spindle rotates at a maximum RPM that is faster than approximately 5000 RPM.

16. The portable cooler of claim 13, further comprising a transmission coupled between the electric motor and the blender spindle.

17. The portable cooler of claim 13, in which the blender spindle is directly driven by the electric motor.

18. The portable cooler of claim 13, in which the insulation compartment comprises an insulation material.

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